KEMENTERIAN
ALAM SEKITAR DAN AIR
Ministry of Environment and Water

MALAYSIA PLASTICS SUSTAINABILITY ROADMAP 2021 - 2030

Catalysing Sustainability and Circularity towards A New Plastics Economy

Published in 2021 by
MINISTRY OF ENVIRONMENT & WATER (KASA), MALAYSIA
Block F11, Complex F
Federal Government Administrative Centre
62000 Putrajaya
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www.kasa.gov.my

Acknowledgement

This Malaysia Plastics Sustainability Roadmap was developed through the active and dedicated participation of various stakeholders, representing federal and state governments, international organisations, academia, associations, industry players, financial institutions, and non-governmental organisations. All the valuable inputs were discussed, analysed and consolidated to shape this document.

The Ministry of Environment and Water would like to express our highest appreciation to the World Bank Group for supporting the background studies prior to the formulation of this Roadmap.

Our sincerest appreciation also goes to Malaysia Green Technology and Climate Change Centre (MGTC) and WWF-Malaysia for the facilitation rendered during the stakeholder engagements and drafting processes.

We are very grateful for the contributions, inputs and insight from the organisations below:

Government Sector

1. Economic Planning Unit (EPU)
2. Ministry of Entrepreneur Development and Cooperatives (MEDAC)
3. Ministry of Federal Territories (KWP)
4. Ministry of Finance (MOF)
5. Ministry of Health (MOH)
6. Ministry of Housing and Local Government (KPKT)
7. Ministry of International Trade and Industry (MITI)
8. Ministry of Science, Technology and Innovation (MOSTI)
9. Ministry of Domestic Trade and Consumer Affairs (KPDNHEP)
10. Department of Environment (DOE)
11. Department of Islamic Development Malaysia (JAKIM)
12. Department of National Solid Waste Management (JPSPN)
13. Department of Standards Malaysia (Standards Malaysia)
14. Malaysian Bioeconomy Development Corporation Sdn. Bhd. (BioEconomy)
15. Malaysia Green Technology and Climate Change Centre (MGTC)
16. Malaysian Investment Development Authority (MIDA)
17. Malaysia Productivity Corporation (MPC)
18. SIRIM Berhad
19. SIRIM QAS International Sdn. Bhd.
20. SME Corporation Malaysia (SMECorp)
21. Solid Waste and Public Cleansing Management Corporation (SWCORP)
22. Economic Planning Division, Kedah
23. Economic Planning Division, Perlis
24. Economic Planning Unit, Kelantan
25. Economic Planning Unit, Negeri Sembilan
26. Economic Planning Unit, Sarawak
27. Economic Planning Unit, Selangor
28. Kedah State Secretary Office
29. Johor State Secretary Office
30. Ministry of Local Government and Housing Sarawak
31. Penang Green Council
32. Terengganu State Secretary Office

International Organisations

1. The World Bank Group
2. United Nations Children's Fund (UNICEF)
3. Waste and Resource Action Programme (WRAP)

Academia

1. Universiti Kebangsaan Malaysia (UKM)
2. Universiti Sains Malaysia (USM)
3. Universiti Islam Antarabangsa Malaysia (UIAM)
4. Universiti Putra Malaysia (UPM)

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1. Association of Malaysian Express Carriers (AMEC)
2. Gabungan Persatuan-Persatuan Penjaja dan Peniaga Kecil Melayu Malaysia (GPPPKMM)
3. Malaysia Plastics Recyclers Association (MPRA)
4. Malaysia Retailers Association (MRA)
5. Malaysian Petrochemicals Association (MPA)
6. Malaysian Plastics Manufacturers Association (MPMA)
7. Malaysian Recycling Alliance Berhad (MAREA)
8. Small and Medium Enterprise Association (SAMENTA)

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34. Pembersihan MYMY Sdn. Bhd.
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36. Petronas Chemical Group Berhad
37. Petronas Dagangan Berhad
38. Q-Wizard Solutions Sdn. Bhd.
39. Recron (Malaysia) Sdn. Bhd.
40. ResourceCo Asia (M) Sdn. Bhd.
41. RS Polymer Sdn. Bhd.
42. Scientex Packaging Film Sdn. Bhd.
43. See Hau Global Sdn Bhd
44. Sha Sejahtera Ent.
45. She Academy & Consultancy (M) Sdn Bhd
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50. The Food Purveyor Sdn. Bhd.
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54. Wahbo (M) Sdn. Bhd.
55. Watson's Personal Care Stores Sdn. Bhd.

Non-Governmental Organisations

1. Amanah Lestari Alam
2. Blue Hope
3. Fuze Ecoteer Outdoor Adventures Sdn Bhd
4. Glimpse of Malaysia
5. Impactlution / Generasi Peduli Sampah
6. RCOMM Lestari
7. Reef Check Malaysia
8. Sampah, Menyampah!
9. WWF Malaysia
10. Yayasan Tzu Chi
11. Zero Waste Malaysia

"We need to shift to a sustainable and circular plastics economy, where we produce and use plastics consciously, and at the same time, tap the economic value from this plastic waste."

YB Dato' Sri Tuan Ibrahim Tuan Man
Minister of Environment and Water

Foreword

COVID-19 virus has already rocked the world in terms of health, safety, economy and social wellbeing in every country. This has challenged us to build resilience as we wade through this pandemic, and the road ahead has to be on a green recovery pathway. We need to keep the balance and embrace the planetary health approach to understand that going green is also development.

The increase in plastic consumption during a pandemic era increases the burden of waste management system and the environmental risk, particularly from plastic and marine pollution. We need to shift to a sustainable and circular plastics economy, where we produce and use plastics consciously, and at the same time, tap the economic value from this plastic waste. In moving forward, Circular Economy is the best practicable model of production and consumption, reducing pressure on the environment, improving the circularity of the supply of raw materials, stimulating innovation, extending product life-cycle, and boosting economic growth while closing the loop.

Malaysia Plastics Sustainability Roadmap, 2021-2030 outlines strategies and action plans to achieve greater plastic circularity levels in Malaysia. We hope that this roadmap will be the guidance policy to all stakeholders in ensuring plastic sustainability along the value chain guided by the concept of circularity and be part of the solution towards a sustainable environment.

Damage has appeared in land and sea because of the doing of the people's hands, that He may make them taste something of what they have done, so that they may come back

(QS. Ar-Rum: 41)

"Sustainable consumption and production patterns are important to reduce the usage of natural resources and environmental degradation, which leads to planetary health."

YBhg. Dato' Seri Ir. Dr. Zaini Ujang
Secretary General
Ministry of Environment and Water

Preface

With today's expanding global population, limited capital, resources, and unprecedented climate change impacts, one thing is certain: the existing economic's linear model will not support sustainable living. New approaches, such as green, environmentally friendly, or circular economy models are evolving, but not yet at scale.

Malaysia has always promoted sustainable development by balancing economic growth and environmental protection, in line with the United Nations Sustainable Development Goals (UNSDGs). Sustainable consumption and production patterns are important to reduce the usage of natural resources and environmental degradation, which leads to planetary health.

Align with the sustainable development agenda, Malaysia is moving towards plastic circularity to close the waste loop and protect the environment. We will build on the findings of current studies and provide ongoing support and guidance to key players within the plastic value chain to adopt circularity. Shifting from a linear to a circular economy for plastics is crucial to decoupling Malaysia's growth from environmental degradation and will help ensure a more sustainable way of life for future generations.

In preserving and sustaining the environment while generating the economy, we need a mutual understanding of shifting towards competitive global supply chains to encourage more multinational and smaller and medium sized enterprises (SMEs) to build sustainable and inclusive business models. These development approaches cannot just be about what governments spend, but it must harness the unprecedented resources of our interconnected world.

Adhering to the SDG's objectives to ultimately achieve the goals, the government would have to measure, monitor progress and manage the efficacy of the policy and interventions along its course. As a result, companies will need to analyse their business strategy's effect on the SDGs and change accordingly. This approach will need data, and information to be collected, verified and reported.

This Malaysia Plastics Sustainability Roadmap is crafted to help inform all stakeholders about the opportunities and necessary measures we must take to unlock the potential value of the plastics industry and subsequently achieve plastics circularity while also supporting the government and global agenda towards a healthier, cleaner and sustainable Malaysia.

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Abbreviations

CAGR	compound annual growth rate
CFR	Collected-for-recycling
C&D	construction and demolition
EMF	Ellen MacArthur Foundation
EOL	end-of-life
EPR	extended producer responsibility
EPS	expanded polystyrene
ESG	environment, social and governance
E&E	electrical & electronics
FMCG	fast moving consumer goods
HDPE	high-density polyethylene
LDPE	low-density polyethylene
LLDPE	linear low-density polyethylene
MAREA	Malaysia Recycling Alliance
MASPA	Malaysia Sustainable Plastic Alliance
MFA	Material flow analysis
MNC	Multi-national company
MPMA	Malaysia Plastic Manufacturing Association
MPRA	Malaysian Plastic Recycling Association
MRF	material recovery facility
MSW	municipal solid waste
Mt	million tonnes
PE	polyethylene
PET	polyethylene terephthalate
PP	polypropylene
PRO	producer responsibility organisation
PS	polystyrene
PVC	polyvinyl chloride
R&D	research and development
rPET	recycled PET
SAS	separation at source
SDG	Sustainable Development Goal of the United Nations
UNEP	United Nation Environment Programme
WWF	World Wildlife Fund
ZWM	Zero Waste Malaysia

Malaysia Plastics Sustainability Roadmap

2021-2030

Executive Summary

Plastic pollution and marine litter are global crises that need to be addressed in a systematic approach along the entire plastic value chain. As Malaysia has always promoted sustainable development by balancing economic growth with environmental protection and societal well-being, this Roadmap will be used to guide the country towards a sustainable plastic economy, enabled through the principles of circularity.

A circular economy for plastics is based on the principles of designing out waste and pollution, while ensuring that the use of plastics offers the highest environmental, social, and economic benefits to the population. Achieving a circular economy for plastics ensures that problematic and unnecessary plastics are phased out up-front, and that plastics at the end of life-cycles are designed to be reused, recycled, or disposed of in a clean and sanitary way, and safely returned to nature where there is any leakage from collection systems. As well as benefitting the environment, this approach will create innovation in materials and processes in Malaysia, boosting the country's economic competitiveness. It also provides significant environmental and public health benefits to the nation.

This document outlines strategies and action plans to achieve greater levels of plastic circularity in Malaysia. The Roadmap is based on science and has been developed in an inclusive manner. The Government conducted a study to understand the concept and mechanisms of a circular economy, and the current ecosystem including policy, regulations, technology, research & development and financing opportunities for plastic from production to end-of-life treatment in Malaysia. Existing options and future opportunities to improve plastic circularity were tested for the viability in the Malaysian economic and regulatory context. This was done by engaging with representatives from public and private stakeholders, civil societies, academicians, as well as financial institutions. What is clear, is that success will only be achieved through a whole nation approach. Each and every part of the society has its part to play and this is a journey that we are all in together.

Glossary & Working Definition

Act-State

States adopting and implementing Act 672 (Solid Waste and Public Cleansing management Act 2007) - WP (Kuala Lumpur & Putrajaya), Negeri Sembilan, Melaka, Johor, Pahang, Kedah and Perlis.

Automotive sector

Referring to plastics usage in automotive manufacturing for a range of parts and components.

Biodegradable plastics

A plastic in which all the organic carbon can be converted into biomass, water, carbon dioxide, and/or methane via the action of naturally occurring microorganisms such as bacteria and fungi, in timeframes consistent with the ambient conditions of the disposal method. (ASTM)

Chemical recycling

The polymerization of long polymer chains into monomers through a chemical reaction by means of heat and/or chemical agents to produce monomer, chemical raw materials and/or fuels.

Circular economy

As envisioned in cradle-to-cradle thinking, the circular economy is defined as an economic model in which resources like plastics are used more efficiently through the three guiding principles of "reduce, reuse and recycle" where possible, while redesigning materials to return to nature if they escape the loop.

Collected-for-recycling (CFR)

Denotes the tonnage or percentage of a particular resin collected through the informal and formal collection sectors within the country, which is then sold to processors and/or recyclers for recycling purposes, as compared to total plastic waste generation.

CFR = Plastic waste collected and accepted for recycling process / total plastic waste generated

Compostable plastics

Plastic that undergoes degradation by biological processes during composting to yield CO2, water, inorganic compounds, and biomass at a rate consistent with other known compostable materials and that leaves no visible, distinguishable, or toxic residue (ASTM).

Construction sector

Referring to application of plastics in construction sector, including insulation, roofing, pipes, and laminates.

Converter

Companies which produce packaging material by converting raw material.

Deposit Return System

A system in which a surcharge is added to the product price on certain products and containers. When consumers return these containers or products after they have become waste, the surcharge is refunded.

Downstream

Refers to actors at the post-consumption stage, including waste management companies, the informal sector, recyclers, and other end-of-life treatment solution providers.

Electrical & electronics

Referring to plastics application in E&E products as well as for its packaging.

End-of-life

End of the product lifecycle which prevents users from receiving benefits, indicating that the product is at the end of its useful life.

Expanded polystyrene

Expanded polystyrene, manufactured from styrene, is a thermal plastic material supplied to moulders in the form of a polystyrene bead. The beads, which contain a blowing agent, are processed and moulded into low-density foam articles, such as protective packaging, and foam insulation for building and construction.

Fast-moving consumer goods

Products that move off the shelves of retail shops quickly, which therefore require constant replenishing. Fast-moving consumer goods include processed foods, prepared meals, beverages, baked goods, fresh foods, frozen foods, ready-to-eat, consumer electronics, medicines (medication that can be purchased without a prescription), cleaning products, cosmetics and toiletries, as well as office supplies.

Extended producer responsibility

An environmental policy tool that makes producers responsible for the entire life cycle of the products that they introduce on the market, from their design until end-of-life (including waste collection and recycling).

Homogeneous plastics

The same type of plastic scraps and clean with no residue contained.

High-density polyethylene

High-density polyethylene (HDPE) is famous for its tensile strength and ability to stand high temperatures. HDPE is used in wide variety of application, including bottles, durable containers, grocery bags, plastic pipe, water coolers as well as fuel tanks, inner and outer protective covers for automotive application.

Kerbside collection

Domestic household waste collection method, typically in urban and suburban areas, where the residents sort their domestic waste according to material type. It is usually accomplished by personnel using specially built vehicles to pick up household waste in provided bins that are acceptable to, or prescribed by, the municipality and are placed on the kerb.

Informal sector

Consist of self-employed individual plastic waste collectors includes scavengers, waste pickers, junk shops, aggregators, scrap dealers that play a significant role in the collection and recovery of reusable or recyclable waste, either directly from the source where no formal collection systems exist, hauler trucks, or landfills and dumpsites, and offered for sale to recyclers directly or through intermediaries to earn a livelihood.

Linear low-density polyethylene

This type of low-density polyethylene increases the degree of crystallinity, which results in impact strength and higher tensile than LDPE. This polyethylene can be processed into thinner films with better environmental stress crack resistance. LLDPE is used predominantly in film applications, but can also be used in cable covering, toys, lids, buckets and containers, and pipes.

Low-density polyethylene

This type of plastic has excellent resistance to acids, bases and vegetable oils. LDPE has significantly relative transparency, toughness, and flexibility, which make it ideal for both packaging and nonpackaging application such as meat and poultry wrapping, dairy products, snacks and sweets, frozen food bags, baked goods.

Material flow analysis

An analytical method to quantify flows and stocks of materials or substances in a well-defined system.

Manufacturer

Companies which produce plastic products by converting raw/ recycled material.

Material value unlocked

Refers to potential monetary benefit from plastic recycling.

Material value unlocked = value yield x CFR rate

Material value loss

Amount of loss when:
(i) plastic resins are not recycled into product (based on best circular scenario for that particular resin); or
(ii) the resins are not recycled at all (e.g. when disposed of in a landfill).

Midstream

Refers to actors at the distribution and consumption stage such as wholesalers, distributors, traders, retailers and consumers.

Mechanical recycling

The processing of plastic waste into secondary raw material or products without significantly changing the chemical structure of the material – (as defined by Basel Convention).

Municipal waste / municipal solid waste

Refer to any substances or scrap materials which the user discards or intends to discard everyday such as product packaging, clothing, bottles, food scrap, etc.

Mismanaged plastic waste

Plastic which is inadequately disposed of or leaks out of collection systems.

Obliged parties

Companies who introduce plastic into the market, comprises of producers, manufacturers, importers, converters and brand owners.These companies are obliged to pay an eco-modulated fees structure to compensate the potential impact of plastic introduced into the market.

Non Act-State

States not adopting Act 672 (Solid Waste and Public Cleansing Management Act 2007) – Sabah (including WP Labuan), Pulau Pinang, Perak, Selangor, Terengganu, Kelantan, Sarawak.

Plastics

Synthetic or semi-synthetic material made of petroleum.

Packaging sector

Packaged daily necessities application using plastics for various products including processed foods, beverages, dry foods, fresh foods, baked food, cosmetics and toiletries, ready-to-eat, frozen foods, consumer electronics, health and hygiene products, office supplies and stationery.

Polyethylene

Also known as PE and used in polyethylene terephthalate (PET), high-density polyethylene (HDPE) and low-density polyethylene (LDPE).

Plastic leakage

Plastic leakage is the potential amount of macro- and micro plastics that are not kept in a circular loop or properly managed at their end-of-life, thus leaking into the environment.

Polypropylene

Polypropylene, also known as PP, is a food-safe plastic. It's used to hold all kinds of foods,beverages and medications. It can also be used to make carpeting, roof membranes and fabric.

Polyethylene terephthalate

Polyethylene terephthalate, or PET, is a strong, durable and recyclable material that is used for soda bottles, water bottles and food jars.

Polyvinyl chloride

A polymer of vinyl chloride used to make a diverse range of cost-effective products with various levels of technical performance suited to a wide range of applications. PVC products include everything from medical devices such as medical tubing and blood bags, to footwear, electrical cables; packaging, stationery, profiles and toys.

Polystyrene

Polystyrene is a hard, solid plastic, that is often used in products that require clarity, such as food packaging and laboratory ware. When combined with various colorants, additives or other plastics, polystyrene is used to make appliances, electronics, automobile parts, toys, gardening pots and equipment and more.

Recyclable

Characteristic of a product, packaging, or associated component that can be diverted from the waste stream through available processes and programs and can be collected, processed, and returned to use in the form of raw materials or products

Post-consumer

The status after an item has been used for its intended purpose. Post-consumer material may be generated by household or commercial establishments.

Resin

Substances which can be organic or inorganic in nature and widely used as raw materials in the manufacturing of plastic products

Recycling rate (Plastic)

Recycled plastic divided by the total amount of plastic waste generated. Material that is reused and avoided is not included in the recycling rate.

Recyling rate = recycled plastic / total amount of plastic waste generated

Reverse vending machine

A device that accepts used (empty) beverage containers like bottles and cans and returns money, points, rewards to the user.

Reusable

Characteristics of a product that can be used in the same form for the same or a different purpose. In this case, the product does not become a waste.

Separation at source

Separation at source (SAS) requires the consumers to sort their waste into categories, to be disposed of and recycled separately.

Recycled PET

Recycled PET (rPET) stands for recycled polyethylene terephthalate. PET is a strong, durable and recyclable material that is used for soda bottles, water bottles and food jars, while rPET can be made into such products as blankets, insulation, car parts, shoes and more.

Sustainable design

The integration of environmental aspects into the product development process, by balancing ecological and economic requirements. Sustainable design should consider environmental aspects at all stages of the product development process, striving for products which make the lowest possible environmental impact throughout the product life cycle.

Single-use plastics

Common plastic items intended to be used only once by consumers before they are disposed of.

Value yield

volume yield X price yield, where:

volume yield = output volume / input volume, and

price yield = price for recycled resin / price for most valuable recycled resin

Upstream

Mainly refers to actors at the production level such as resin producers, plastics manufacturers (also referred to as converters), importers and brand owners.

CHAPTER 1 - INTRODUCTION

1.1 Overview of Global and Malaysia Plastics Landscape

1.1.1 The global plastics industry

Plastics have become one of the most utilised and important materials in our lives due to its versatility, durability, flexibility and convenience, in addition to being lightweight and low-cost. This is reflected in the production of plastics which have doubled since 2000, outpacing all other bulk materials such as steel, aluminium and cement [1]. In 2019, global plastics production reached 368 million tonnes and the annual global production of plastics is projected to reach 600 million tonnes in 2050, almost double the figure recorded in 2015 [2]. The growth of plastics consumption is in parallel with its production. As emerging economies grow, their consumption of plastics is projected to surge accordingly.

The global plastics market size increased from USD502 billion in 2015 to USD568.9 billion in 2019 and USD579.7 billion in 2020[3]. It is projected to grow to USD616.82 billion in 2028, at a compound annual growth rate (CAGR) of 5.0% in the forecast period, which is from 2021-2028. Polypropylene (PP), low-density polyethylene (LDPE/LLDPE), high-density polyethylene (HDPE), polyvinyl chloride (PVC) and polyethylene terephthalate (PET) are the most produced resin type globally. **Figure 1** shows the trend for global production of key plastic resin (1980 – 2050).

Demand for plastic production and usage cuts across multiple economic sectors. Demand for plastics is particularly high in the food & beverage packaging, consumer goods packaging, automotive, and electrical & electronics sectors. Plastics have the ability to ensure food quality, minimise food deterioration and avoid contamination, while providing flexibility, elasticity and durability.

The packaging sector consumes the largest proportion of plastics, accounting for 36% of global plastics production in 2015. The upward trend is expected to continue, consistent with the plastics production projection for 2020 – 2050. Since most plastic packaging is designed as single-use plastics, it is reported to contribute half of all plastic waste in 2015. The construction sector is the second largest consumer of plastics (16%), followed by textiles (14%)[4]. In terms of resins used, polyolefin-based plastics comprise the largest share globally.

Specifically, the polyethylene (PE) product segment is the most commonly used resin with over 30% market share. PE Resins (including HDPE, LDPE/LLDPE) are widely used for packaging applications due to its superior properties such as durability, cost and efficiency[5].

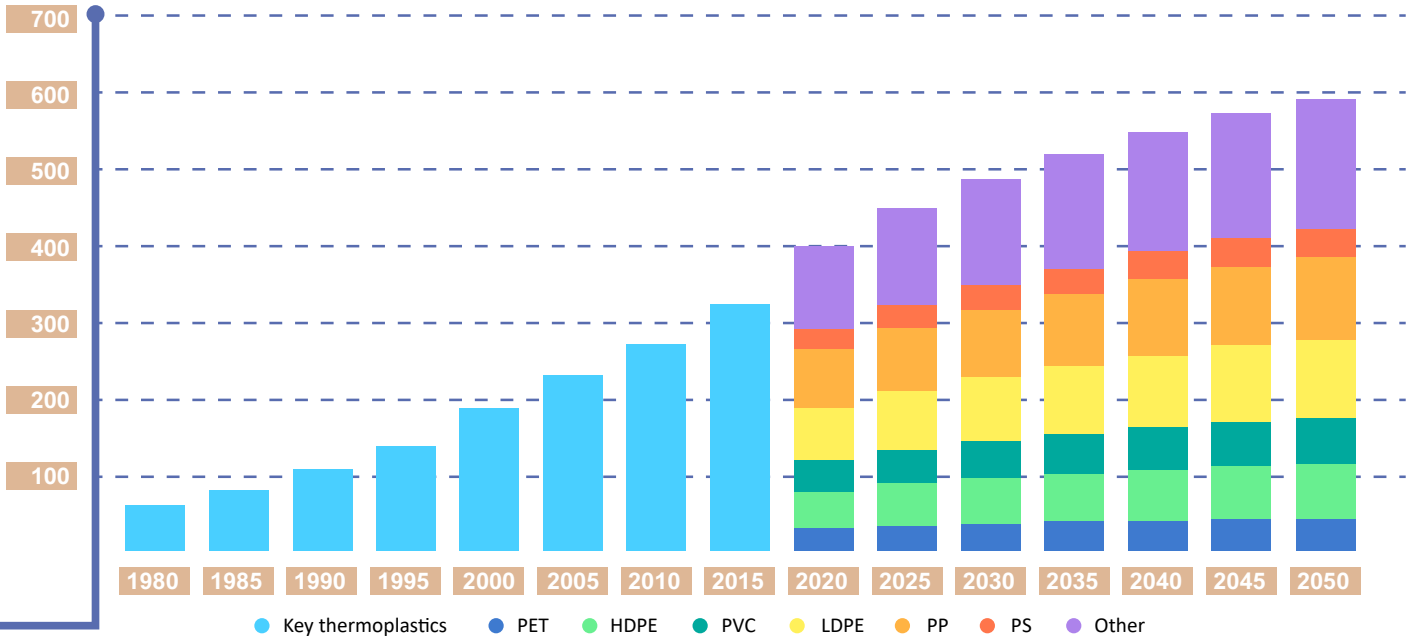


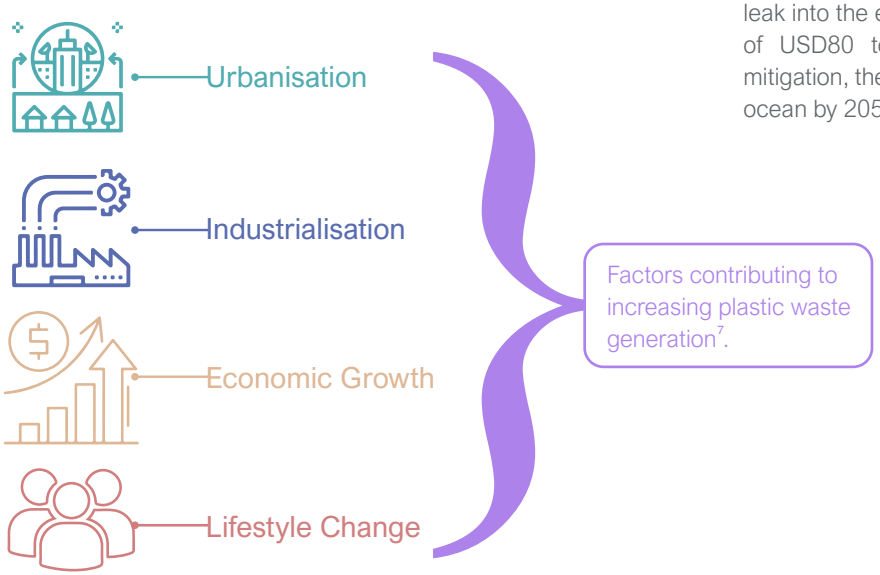
Figure 1: Global production trend on key resin (1980 - 2050)[6]

[1] IEA. 2018. The future of petrochemicals: Towards more sustainable plastics and fertilizers. Paris. International Energy Agency
[2] Ibid.
[3] Statista. 2021. Global Market Value of Plastic. www.statista.com/statistics/1060583/global-market-value-of-plastic [20 September 2021]
[4] Scott, A., Pickard, S., Sharp, S. 2020. Phasing out Plastics. https://odi.org/en/publications/phasing-out-plastics/ [20 September 2021]
[5] Market Research Future. 2021. Global Plastics Market by Type, Size, Growth and Forecast to 2027, https://www.marketresearchfuture.com/reports/plastics-market-8347 [3 September 2021]
[6] IEA. 2020. Production of key thermoplastics 1980-2050. Paris. International Energy Agency

1.1.2 The global plastic challenges

The magnitude of the problem of mismanaged plastics lies in the fact that plastics can persist for several decades. When plastics break-up it can create microplastics which might be invisible to the human eye but are harmful to natural ecosystems when it accumulated in the environment. Based on studies conducted on plastic waste that has ended up in shorelines and coastal regions, researchers have found that around 79% of microplastics are less than 5 years old. The need to tackle plastic pollution in general and microplastics specifically is live and urgent.

Close to 370 million tonnes of plastic were consumed in 2019, and overall plastic waste collection volumes were estimated to be 45% to 50% of the total consumption. The global plastic waste management market size is expected to increase from USD32.9 billion in 2019 to USD239.4 billion by 2025, growing at a CAGR of 3.05% over the 2020-2025 forecast period.



However, the reality is that plastic waste management is inadequate at a global level. Globally, one third of plastics (32%) ends up in the natural environment as mismanaged waste. The majority of this ends up on land, which then makes its way into the marine environment.

Even when it is properly collected and disposed of, less than a third of plastics waste is recycled while the remainder either sent to landfills or incinerated or sent for energy recovery. A 2014 study by the United Nations Environment Programme (UNEP) estimated the natural capital cost of plastics resulting from environmental degradation, contributions to climate change, and health impacts amounted to USD75 billion annually in the consumer goods industry alone[8]. Whereas WWF found out that the pollution, emissions and clean-up costs of plastic produced in 2019 alone could be USD3.7 trillion. It is also estimated that 11 million tonnes of plastic waste are entering the ocean every year[9].

Packaging accounts for more than 40% of overall plastic consumption and comprises more than 55% of total global plastic waste.However, less than 15% of the plastic packaging waste generated is collected for recycling and huge amounts leak into the environment. This not only results in a yearly losses of USD80 to 120 billion, but without any intervention or mitigation, there could be more plastic than fish (by weight) in the ocean by 2050[10].

[7] European Metal Recycling. 2020. Global Plastic Waste Management Market Report and Forecast 2020-2025. https://www.expertmarketresearch.com/files/images/Global-Plastic-Waste-Management-Market-Report-and-Forecast-2020-2025.png [23 September 2021]

[8] UNEP. 2014. Valuing plastic: the business case for measuring, managing and disclosing plastic use in the consumer goods industry. Nairobi. United Nations Environment Programme

[9] World Wildlife Fund. 2021. Plastics: The costs to society, the environment and the economy. https://wwfint.awsassets.panda.org/downloads/wwf_pctsee_report_english.pdf [20 September 2021]

[10] Ellen MacArthur Foundation. 2017. The New Plastics Economy: Rethinking the future of plastics & catalysing actions. https://ellenmacarthurfoundation.org/the-new-plastics-economy-rethinking-the-future-of-plastics-and-catalysing [22 September 2021]

1.1.3 Malaysia plastic landscape

Plastics production

The plastics industry contributes a significant amount to Malaysia's economy. A total turnover of RM33.10 billion was registered in 2019[11], representing an increase of 6.8% from RM30.98 billion in 2018. Export grew by 2.9% from RM14.60 billion in 2018 to RM15.03 billion in 2019, while import of plastic products grew 5.4% to RM11.89 billion[12]. Exports however declined by 11% to RM13.3 billion in 2020 due to a weaker global economy caused by the COVID-19 pandemic.

Looking from the resin importation and production perspective, Malaysia is a net exporter of plastic resin. According to Ministry of International Trade and Industry (MITI), the country imported close to 3.1 million tonnes of resin in 2019, while exporting 3.5 million tonnes. In total, Malaysia's consumption of key resin adds up to 1.7 million tonnes, with the largest volumes comprised of PP, PE, LDPE/LLDPE, HDPE and PET (for polyester and packaging purposes). Detailed volume of resin produced and consumed can be found in **Figure 2**[13].

In terms of consumption , the packaging, electrical & electronics (E&E), construction and automotive sectors account for 91% of the Malaysian plastics manufacturing industry's RM33.10 billion annual turnover (see **Figure 3** for details). Packaging is the largest end-use sector, consuming 48% of resin to produce plastic bags, containers, films, plates, sheets, foil, strip bottles and boxes.

Characteristics such as flexibility, strength, lightness, stability, impermeability, and ease of sterilization make plastics an ideal packaging material for all types of commercial and industrial users, in both flexible and rigid formats. The E&E comes is the second largest consumer, with 27% of total resin consumption and mainly used for electrical components/ parts and home appliances such as casings for television sets, radios, parts for

[11] Malaysia Plastic Manufacturer Association. 2020. Annual Report 2020. https://mpma.org.my/v4/wp-content/uploads/2020/09/MPMA-AR2020-FINAL-30092020.pdf [22 September 2021]
[12] Ministry of International Trade and Industry. 2019. MITI Report 2019. https://www.miti.gov.my/miti/resources/MITI%20Report/MITI_REPORT_2019.pdf [21 September 2021]
[13] World Bank. 2021. Market Study for Malaysia: Plastic Circularity Opportunities and Barriers

air-conditioning units, telephones and accessories. Construction and automotive are the third largest consuming sectors (8%), where plastics are typically used for insulation, roofing, pipes and laminates for construction due to its durability and resistance to corrosion, effective insulation, cost-efficiency, hygiene and ease of installation, operation and maintenance.

Plastics provide energy absorption, weight reduction and innovative design, while contributing to passenger safety, which is crucial in the automotive sector. Plastics are used to manufacture a range of exterior and interior parts and components, from engine components to chassis, exterior to interior, to electrical and safety units. Household, agriculture and others use the remaining resin at 3% each, mainly due to plastics' resistance to aggressive environment and to most chemicals, making it suitable for products that require longer lifespan.

Malaysia's annual per capita plastic packaging consumption is high among all the Southeast Asian countries at 16.78 kg/person[14]. Total household plastic packaging consumption in the country was estimated at 523,000 metric tonnes in 2020. This consumption is mainly driven by private households, small businesses, and other end users, such as schools, hospitals, and government buildings.

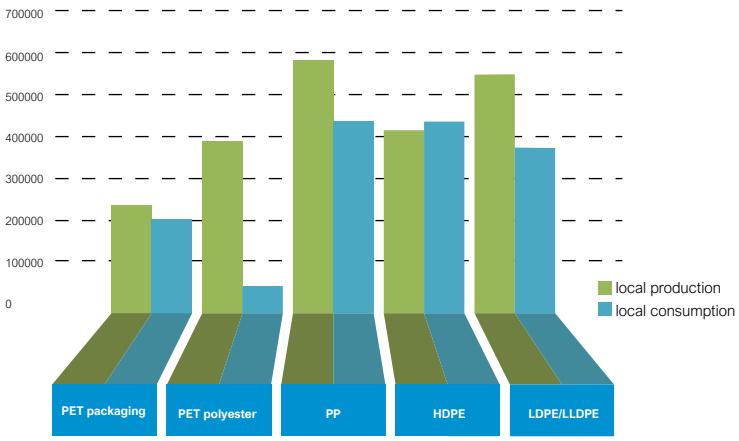


Figure 2: Production and trade volume of key resins in Malaysia in 2019, in tonnes.
Data collated based on World Bank's Material Flow Analysis. Production data based on industry sources [15].

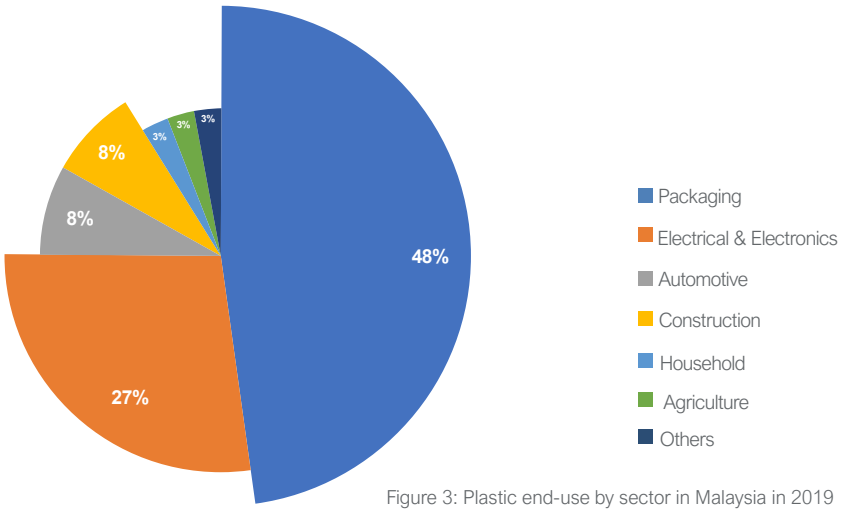


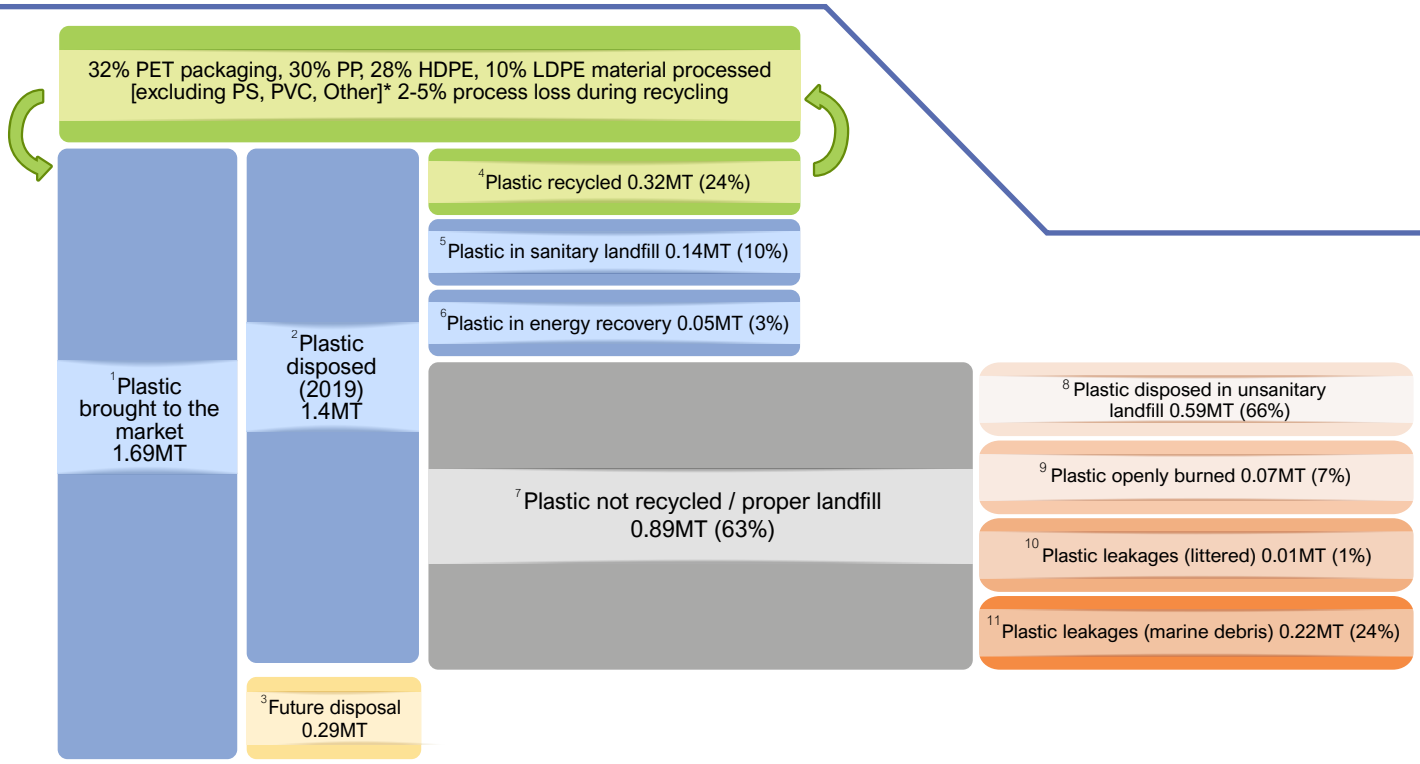
Figure 3: Plastic end-use by sector in Malaysia in 2019

[14] World Wildlife Fund. 2021. Plastic packaging in Southeast Asia and China. https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Plastic_Packaging_in_SE_Asia_and_China2020_WWF%20-%20Copy.pdf [19 September 2021]
[15] World Bank. 2021. Market study for Malaysia: plastic circularity opportunities and barriers. Washington. The World Bank

Magnitude of the problem

Waste management systems are constantly challenged by increasing waste generation and the limited resources and infrastructures in place, with plastics providing the second highest amount of overall domestic waste[16]. Malaysian household waste generation varies geographically and by economic status, ranging from 0.85 to 1.5kg per person per day. Based on the estimated population, an annual post-consumer plastic waste generation was 1.07 million tonnes in 2016[17]. Comprising mostly PET, PP, LDPE/LLDPE, and HDPE, this figure rose to 1.4 million tonnes in 2019. Around 0.14 – 0.37 million tonnes of mismanaged plastic waste leaked into the ocean, as reported by Jenna Jambeck in 2016. This figure grows exponentially with increased plastic waste.

Based on the study by World Bank on plastic circularity opportunities in Malaysia, it was reported that only 24% of plastics (from four main resins (PET, PP, LDPE/LLDPE and HDPE)) introduced to the market in 2019 were recycled[18]. While 13% were either being processed for energy recovery or being sent to sanitary landfill, the remaining 63% were not recycled or disposed of in proper facilities, which contributed to leakage into the environment, as seen in **Figure 4.**



[1] Including virgin + recycled resin converted locally + imported end packaged product – exported plastic product
[2] Plastics produced into products which consumed and disposed in 2019 only
[3] Stocks/inventory and yet to be consumed/disposed
[4] Plastic recycling (2019) rates; PS, PVC, Others – less recycling value, hazardous & no recycling technology
[5] Plastic waste disposed in legally operated landfill, e.g.: Bukit Tagar Sanitary Landfill, Worldwide Landfill Park
[6] Waste-to-Energy facility, e.g.: WTE plant (Langkawi & Kajang), landfill gas (Bukit Tagar & Jeram), processed engineered fuel (ResourceCo)
[7] Contaminated with other substances including organic waste & ink + leaked from the SWM stream + illegal dumping; product by-design is not recycling friendly, less recycling value, no recycling technology
[8] Illegal dumping
[9] Including illegal recycling facilities, e.g.: Jenjarom & Sg. Petani
[10] Plastics littered remains on land
[11] Plastics littered found on coastal areas as well as in the ocean, not including ghost nets and abandoned fishing gears (fishing lines, buoy, etc.)

Figure 4: Material flow analysis on four main resins, 2019

[16] NSWMD. 2013. Survey on SW Composition, Characteristics & Existing Practice of SW Recycling in Malaysia. Putrajaya. Department of National Solid Waste Management.
[17] WWF Malaysia. 2020. Study on EPR scheme assessment for packaging waste in Malaysia. Petaling Jaya. World Wildlife Fund Malaysia
[18] World Bank. 2021. Market study for Malaysia: plastic circularity opportunities and barriers. Washington. The World Bank

Market potential

In 2019, 1.69 million tonnes of PET, PP, LDPE/LLDPE and HDPE were brought into the Malaysian market, and 1.4 million tonnes were estimated to be disposed (managed or unmanaged) in the same year. The total material value disposed of, if recycled, had the potential value equal to USD1.3 billion.

However, due to a 24% recycling rate of plastic and a value yield of 77% from the resins which were recycled, only USD234 million (19%) per year is being unlocked. This results in USD1.0 to 1.1 billion of potential material value that is untapped.

Table 1 summarizes the potential value loss for these key resins for 2019.

Resin	Average CFR rate (%)	Value yield (%)	Material value unlocked (%)	Material value loss (USD million)/year
PET - packaging	36.5	79	29	91 - 109
PET - polyester	2.5	67	2	26
PP	30	75	22	259 - 285
LDPE/LLDPE	10	84	8	258 - 283
HDPE	28	74	20	327 - 376

Table 1: Potential value loss for key resins, 2019

[19] World Bank. 2021. Market study for Malaysia: plastic circularity opportunities and barriers. Washington. The World Bank
[20] ibid

1.2 Challenges to Plastics Circularity and Sustainability in Malaysia

Based on a comprehensives literature review and stakeholder consultation, 14 key challenges have been identified across plastics value chain which require specific interventions with pragmatic approaches. These challenges have been analysed in terms of their root causes that can be grouped into four categories: market/economy, technology, regulatory, and culture/society. These have been mapped to reflect the level of control and impact as seen in **Figure 5.**

The first quadrant represents key challenges that require industry interventions, while key challenges in the 2nd quadrant calls for government interventions. The 3rd quadrant highlights the enforcement issues and the 4th quadrant is about providing funding for R&D activities.

Table 2 further explains the challenges that may create bottlenecks for plastics circularity and sustainability in Malaysia.

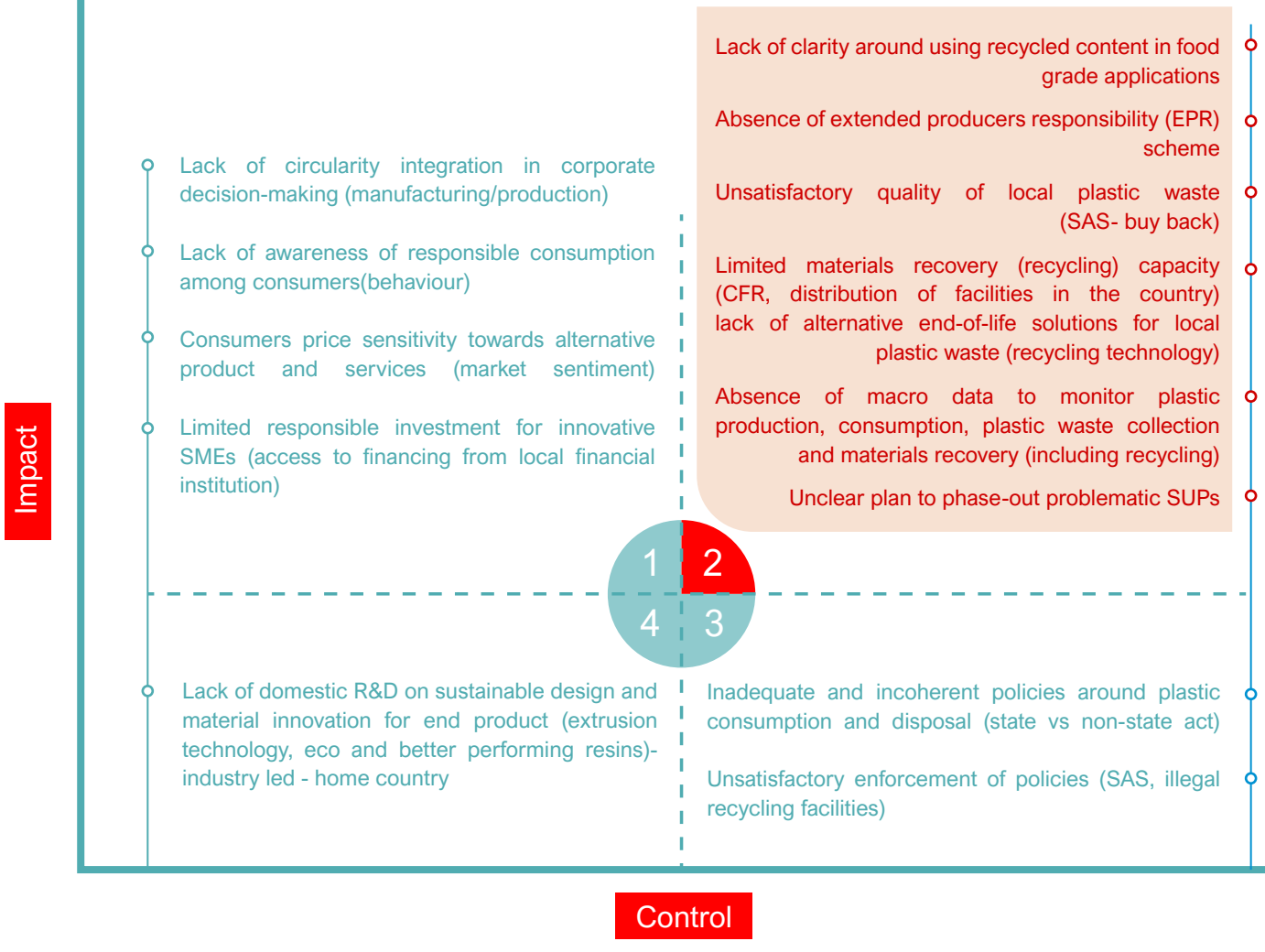


Figure 5: Key challenges mapping

Challenges	Bottlenecks/Barriers
Lack of clarity around using recycled content in food grade applications	Uncertainties and unclear policy direction, as well as guidelines around the use of recycled content have limited the usage of locally produced recycled resin in F&B packaging. This also relates to the concern over halal status for food-contact packaging made of recycled resin.
Absence of extended producers responsibility (EPR) scheme	The adoption of EPR schemes in Malaysia has been limited to voluntary efforts from the private sector around packaging. EPR schemes are regarded as useful interventions for reducing plastic pollution, as they help to shift the responsibility of end-of-life treatment to producers or importers who have introduced the products into the market place. Such schemes can promote reducing waste at source, improve product design, and encourage producers to explore circular business models.
Unsatisfactory quality of local plastic waste (SAS – buy back)	The lack of practicing separation at source among households contributes to the low-quality waste stream. Consumers should be incentivised or rewarded through a buy-back program to encourage them to segregate and send their plastic waste to a proper drop-off/recycling centre.
Limited materials recovery (recycling) capacity (CFR, distribution of facilities in the country)	Only 24% of the total plastic waste are being collected for recycling. The lack of recovery activities/processes leads to low-quality waste and uneven distribution of facilities across geographies.
Lack of alternative end-of-life solutions for local plastic waste (recycling technology)	Alternative EOL solutions to mechanical recycling, such as chemical recycling, are limited in application. While mechanical recycling may be the best available technology for rigid plastic, chemical recycling should be able to take care of the soft-plastic/films, etc.
Absence of macro data to monitor plastic production, consumption, plastic waste collection and materials recovery (including recycling)	Information on production volumes per plastic application is lacking, as is data on plastics consumption, waste collection, and recycling. This lack of national-level data, and independent and authoritative source of information, poses obstacles for various value chains as well as the government.
Unclear plan to phase-out problematic SUPs	While Malaysia does not plan to outright ban any particular plastic product, it is now clear that problematic SUPs need to be phased-out. However, there are no details on the plan. Identification of a list of problematic SUPs is needed at the national level prior to phasing them out.
Lack of circularity integration in corporate decision-making (manufacturing/ production)	Circularity integration is lacking in the steps of product design, procurement and production due to concerns over cost, quality and performance. Low awareness level and knowledge around the circular economy among corporates also hinders the adoption of circular models in their business operations.
Lack of awareness on responsible consumption among consumers (behaviour)	Inadequate education efforts and convenience leads to a lack of awareness of responsible consumption among consumers. Levels of awareness also differs among different segments of consumers, where young, urban consumers are relatively more conscientious in their consumption behaviours than other age and geographical groups.
Consumers' price sensitivity towards alternative products and services (market sentiment)	Malaysian consumers are convenience- and cost driven. The premium price makes a product or service less appealing to consumers, thus discouraging brand owners from widely adopting circular solutions into their product and service portfolios.
Limited responsible investment for innovative SMEs (access to financing from local financial institution)	The recycling industry and wider circular economy innovation is often misunderstood and not seen as an investable opportunity by local financial institutions. Interventions that allow for more accessible financing can help innovative SMEs grow and contribute toward plastic circularity and sustainability.
Lack of domestic R&D on sustainable design and material innovation for end product (extrusion technology, eco and better performing resins) – industry led – home country	There is lack of R&D funding for sustainable design and material innovations both from the government and within the private sector. To move forward, more funding needs to be made available to support R&D endeavours in extrusion technology, producing sustainable and better performing resin as well as products.
Inadequate and incoherent policies around plastic consumption and disposal (state vs non-state act	The solid waste management differs in Act 672 state and non-state. This led into inconsistent implementation at a nationwide scale.
Unsatisfactory enforcement of policies (SAS, illegal recycling facilities)	Effective enforcement across the value chain is important in improving waste management. Lack of enforcement will contribute to low compliance with the waste segregation at source mandate, and lax oversight of the recycling industry. This creates a blurred line between legal and illegal operations.

Table 2: Summary of challenges to plastics circularity and sustainability in Malaysia

CHAPTER 2 - MALAYSIA PLASTICS SUSTAINABILITY ROADMAP

2.1 Objective

To sustainably address plastic pollution in Malaysia, ensuring economic development, environmental protection and societal wellbeing

To provide guidance and promote sustainable business practices in ensuring plastics circularity and sustainability through circular economy approach

To harmonise actions along plastic value chain through adoption of life cycle approach

2.2 Scope

This Roadmap will cover four types of resin: PP, PET, HDPE and LDPE/LLDPE. These resins are the most highly produced and disposed of in Malaysia, commonly used for single-use packaging with shorter application lifetimes and possess the highest recyclable value as reflected in **Table 3.**

As mentioned in Section 1.2, four sectors have been identified as the top end-users of plastics; packaging, electrical and electronics, construction and automotive. In the first and second phase of this Roadmap, effort is concentrated on ensuring plastic sustainability and circularity in the packaging sector. As we progress along, the effort will be extended to the remaining sectors accordingly.

In-line with the government's circular economy and sustainability agenda in the 12th Malaysia Plan, this Roadmap will be part of national efforts to balance between socioeconomic development and environmental sustainability. Supporting the Malaysia Roadmap towards Zero Single-Use Plastics, the aim and target of this Roadmap is to set Malaysia on a pathway to plastics sustainability for 2030, and beyond. To ensure implementation of the Roadmap is monitored and kept up-to-date, a mid-term review will be carried out in 2026.

The implementation of this Roadmap calls for whole-of-nation participation, involving federal and state authorities, industry players, academia, civil societies, and the public. As a living document, this Roadmap will be updated from time to time, taking into account advancements in technology and real-time circumstances in accordance with national priorities.

	USE (virgin resin)	USE (recycled resin)
1 PET	plastic bottles for soft drinks, water, juice, food jars ovenable film and microwavable food trays textile, monofilament, carpet, strapping, films and engineering mouldings	rFiber: carpet, fleece jacket, comforter fill, bags, etc rPET (food-grade): containers for food, beverages bottles rPET (non food-grade): Films, sheets, strapping
2 HDPE	packaging application: shampoo bottles, plastic bags automotive application: fuel tanks, inner and outer protective covers	rHDPE for packaging application rHDPE for industrial application: automotive and electronics components
4 LDPE LLDPE	films for both packaging and non-packaging application such as meat and poultry wrapping, dairy products, snacks and sweets, frozen food bags, baked goods	rLDPE/rLLDPE for plastic lumber, furniture, trash bags, sheeting, films for agriculture, flooring
5 PP	rigid and flexible packaging automotive application - battery cases and trays, bumpers, fender liners, interior trim, instrumental panels and door trims fibres and fabrics	rPP for packaging application rPP for industrial application: automotive, electronics and furniture industries

Table 3: Resin classification (adopted from American Chemistry Council)

2.3 Strategies

2.3.1 Improving product design, collection and sorting outcomes

One of the key steps in plastic sustainability is to ensure that materials are kept in circulation for as long as possible (in its highest possible value), can easily be recovered and recycled, and effectively reused. This can be done at the product design stage, as well as during the collection and sorting of plastic waste.

Design is one of the key elements in the circular economy approach, where the aim is to design out waste from the ecosystem. It must consider the hazard, exposure, and energy used during the material extraction, manufacturing, consumption and end-of-life management. Improving product design includes simplifying a product to be mono-material as an alternative to flexible packaging, using recycled resin as material input without compromising product quality and performance, easy disassembly, as well as designing out problematic material. A focus on the design element of plastics allows us to produce products where material value can be optimised and can be kept in the loop for longer.

As well as being designed to remain in the loop as much as possible, products also needs to be redesigned to ensure it does not harm to nature should it ends up in the environment as mismanaged waste. Mismanaged waste is currently the end-of-life scenario for 63% of plastics in Malaysia. While this Roadmap contains concrete action to reduce the level of mismanaged plastic waste, we must also ensure that Malaysia's contribution to plastics pollution is tackled urgently. New technologies and standards now exist to ensure that while remaining recyclable, plastic packaging materials can return to nature safely. Malaysia will adopt new standards and the uptake of advanced technologies.

Plastic waste collection and sorting need to be strengthened to ensure cleaner waste streams and reduce the amount of mismanaged waste. This can be achieved through a proper kerbside collection, where waste is separated according to types to reduce contamination. Community collection centres also play a significant role in collecting more plastic waste as it is within reach, hence making it easier for the public to drop-off their recyclables. Reward scheme like reverse vending machines, or buy-back programmes can be introduced to incentivise recycling effort and increase awareness among the public.

A range of actions are required to achieve higher-quality outcomes in sorting facilities. These should include efforts to mainstream locally fragmented informal sectors/scavengers. The role played by informal sectors has the potential to contribute to the overall waste management ecosystem. Malaysia should start tapping the potential which lies within informal sectors by embarking on initiatives such as formal registration processes through a controlled mechanism. In addition, changes to industry standards and contractual arrangements that demand a higher-quality sorting outcome will facilitate improvements along with more robust data collection.

To complement the measures above, Malaysia will also take necessary action in phasing out the most problematic single-use plastics based on an application's necessity, recyclability, toxicity, disruption to recycling process, and probability of being mismanaged. The list will be prioritised based on consumption, impact and available alternatives[21]. Certain types of exemption may be provided for deployment of biodegradable technology to mitigate initial impact on industry and consumers. New standards will be developed to govern this and reference can be made with other internationally accepted standards such as the ASTM D6400-05, D5338-09, ISO 17088, ISO 14855-2, ASTM D7081-05, D6691-05, ISO 14852-199, ISO 14851 and BSI PAS 9017 standards.

In coming up with national problematic single-use plastic list, consultation will take place across industries and consumers to build a balanced perspective on what to be deemed as problematic plastic in Malaysia.

2.3.2 Market development and innovation to grow a circular economy

Developing an advanced plastic waste collection and recycling market in Malaysia requires industry to rethink the packaging, rethink the product, and rethink the business model.

Malaysia aims to achieve plastic sustainability by adopting these

Three Key Innovation Strategies

- **PHASE-OUT**
- **REUSE**
- **MATERIAL CIRCULATION**

[21] Ellen MacArthur Foundation. 2020. The circular economy solution to plastic pollution. https://plastics.ellenmacarthurfoundation.org/breaking-the-plastic-wave-perspective [10 September 2021]

PHASE-OUT

Products that do not serve an essential function need to be indirectly phased-out through innovation. This includes development of new products that function similarly or better, without jeopardising the quality and efficiency, while remaining easily recyclable. For example, a few innovations are already being introduced in the global market to replace plastic packaging. One of them is "Apeel" - an edible coating made from plant material that extends the shelf-life of fresh fruit and vegetables, replacing the usual plastic wrapping. Another example is "Ooho", an edible and home compostable 'blobs' for beverages and condiments made from seaweed."Ooho" can be used as a sachet for takeaway sauces and condiments, as well as single-use beverage bottles and cups[22].

"Thong Guan Industries Berhad, a local plastic converter, has produced nano stretch film that can replace the normal multi-layered stretch film, used to wrap pallets and goods. Nano stretch film is a plastic film that is not only very thin, but provides good grip and better load stability and durability. It is also resistant to tear and puncture, consistent in performance and fit for high-speed wrapping."

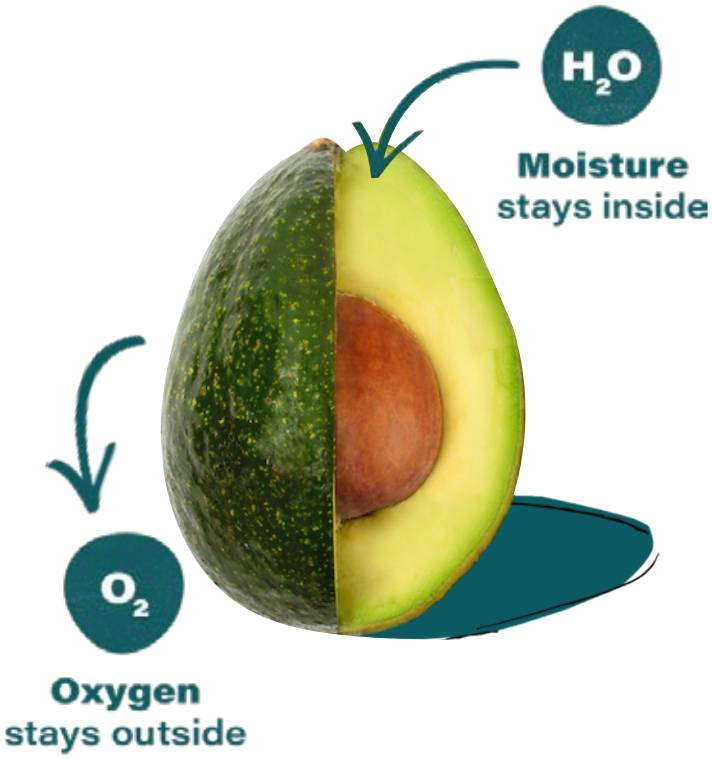
This will not only reduce the operational cost, but also the consumption and wastage of material.

"Apeel"

an edible coating made from plant material that extends the shelf-life of fresh fruit and vegetables

"Ooho"

an edible and home compostable 'blobs' for beverages and condiments made from seaweed.



[22] Ellen MacArthur Foundation. 2020. Upstream Innovation: a guide to packaging solutions. https://ellenmacarthurfoundation.org/upstream-innovation-a-guide-to-packaging-solutions [19 September 2021]

REUSE

This strategy focuses on reusing packaging, rather than discarding after one use. These models have been implemented in Malaysia by local business operators through the Zero Waste Pledge Certification programme initiated by Zero Waste Malaysia (ZWM).

"Zero Waste Malaysia is a non-profit organisation registered under The Registry of Malaysia and a community group based in Malaysia advocating for sustainable development and aiming to increase the local community's awareness of sustainable living. With a vision to mainstream zero waste lifestyle, ZWM encourages the community to minimise the general waste footprint and embrace the circular economy by challenging conventional methods to reduce waste generation and utilise waste as input material[23]."

Table 4: Example of REUSE model implementation in Malaysia

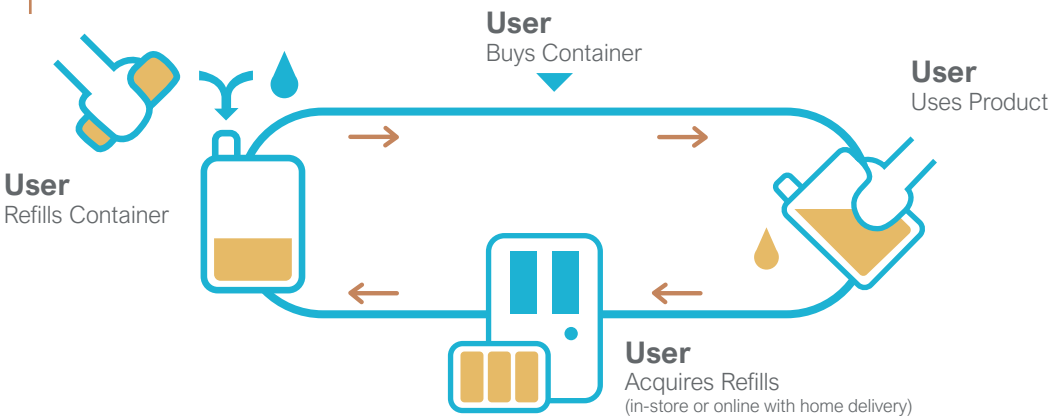
Refill at home

How it works

- Users refill a reusable container at home with refills delivered to the door.
- Users retain the ownership of the packaging and are responsible for cleaning their reusables.

Example of local players

- Minus Zero Waste Store (Johor)
- LiquidETC "Roving Refillery" (Selangor)
- PYNG Zero Waste (Johor)
- TM Organic Farms (Pahang)



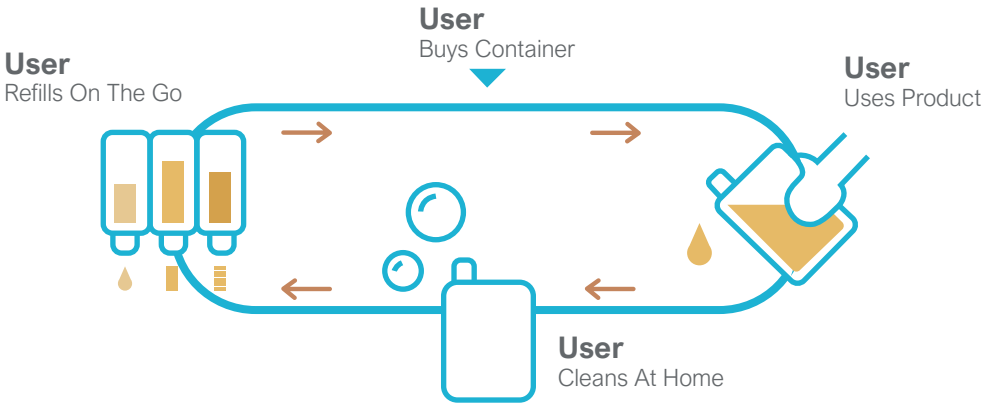
Refill on the go

How it works

- Users refill a reusable container at the store – either a zero-waste store or a traditional grocery store.
- Users retain the ownership of the packaging and are responsible for cleaning their reusables.

Example of local players

- Seedy Zero Waste Store (Selangor)
- Nude The Zero Waste Store (Selangor)
- The Hive Bulk Food (Kuala Lumpur)
- Zero Waste Earth Store (Selangor)
- The Natural Marketplace (Selangor)
- Healthea Grocer (Pahang)
- Kita Refill (Kuala Lumpur)



[23] Zero Waste Malaysia. 2021. www.zerowastemalaysia.org

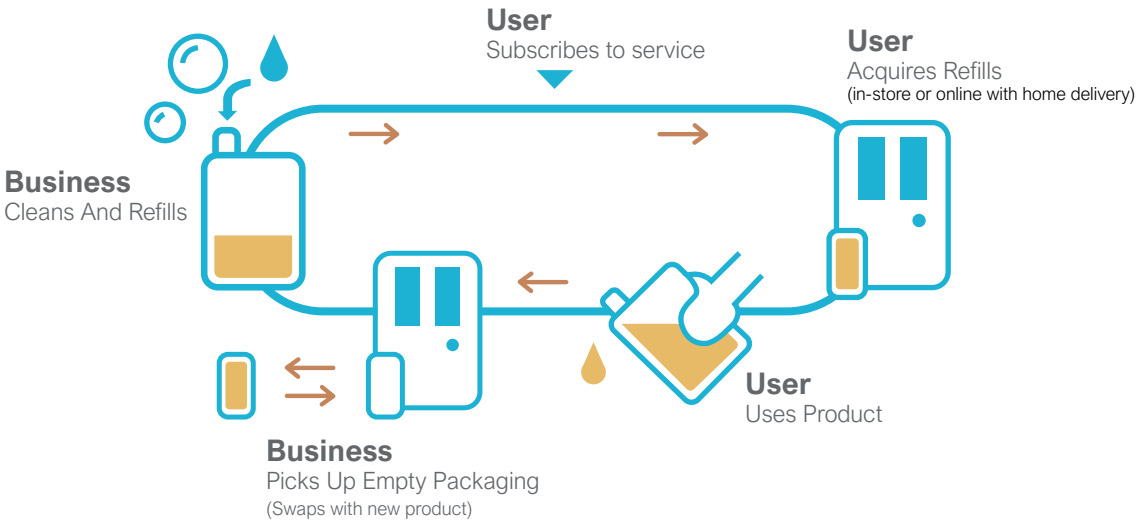
Return at home

How it works

- Users subscribe to a service provider that allows them to return empty packaging from home.
- A service-provider then takes care of cleaning and redistribution of the packaging.

Example of local players

- My Milk Home Delivery (Selangor)
- Thanks Nature Store (Selangor)



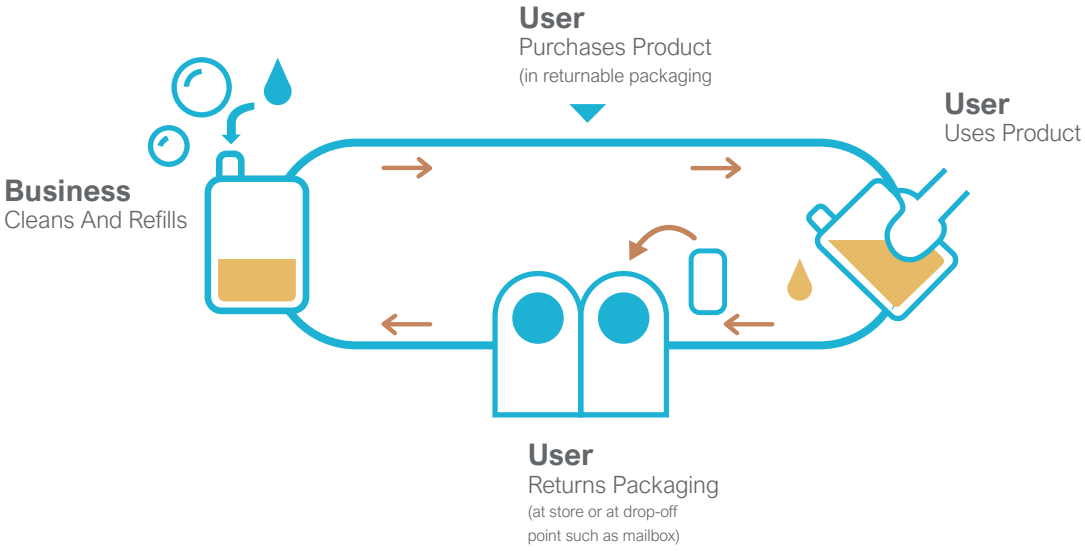
Return on the go

How it works

- Users purchase a product whereas the packaging can be returned to the seller or a drop off point.
- The packaging is either cleaned or the business takes care of the cleaning.

Example of local players

- Homemade4all (Kuala Lumpur)
- Fruitsfarm in the City (Selangor)
- Hup Teck Soy Sauce Factory (Perak)



MATERIAL CIRCULATION

To ensure material circulation, plastic waste has to be properly collected, sorted, treated and processed into recycled resin. Besides collecting plastic waste using the conventional method, for example kerbside collection and drop-off point/ centre, Malaysia should introduce and implement initiatives such as Reverse Vending Machine (RVM) and Deposit Return Scheme (DRS).

"KLEAN Malaysia, for example, has been collaborating with Shell Malaysia where a few units of smart RVMs are placed at some Shell stations in Kuala Lumpur. Public will be rewarded with points upon depositing their used plastic containers and bottles, and these points can be redeemed for rewards from KLEAN's partners via the KLEAN App[24]."

We can also leverage the existing fleet-system and logistics service to recover plastic waste from households. Similar to the 'return at home' or 'return on the go' model highlighted above, e-hailing and food delivery services can be mobilised to collect homogenous and clean plastic.

[24] KLEAN. 2021. www.klean.asia

2.3.3 Building capacity for reprocessing and manufacturing of recycled product nationally

The most significant limitation of recycling is that not all materials can be recycled. Public's confusion about types of materials that can be recycled often leads them to placing recyclables in the trash and being wasted, vice-versa. Other challenges in the recycling ecosystem are obsolete infrastructures, reduced markets for recycled materials and varieties of methods used to measure recycling performance [25].

The lack of capability to collect plastic waste results in large annual loss of recyclable material and affects the effectiveness of recycling industry. Pre-consumer industrial waste is homogeneous and clean in nature, making recycling it much easier[26]. However, because the volumes of post-consumer waste are far greater than those generated in commerce and industry, both post-consumer and post-industrial waste must be collected and processed together in order to attain high overall recycling rates [27].

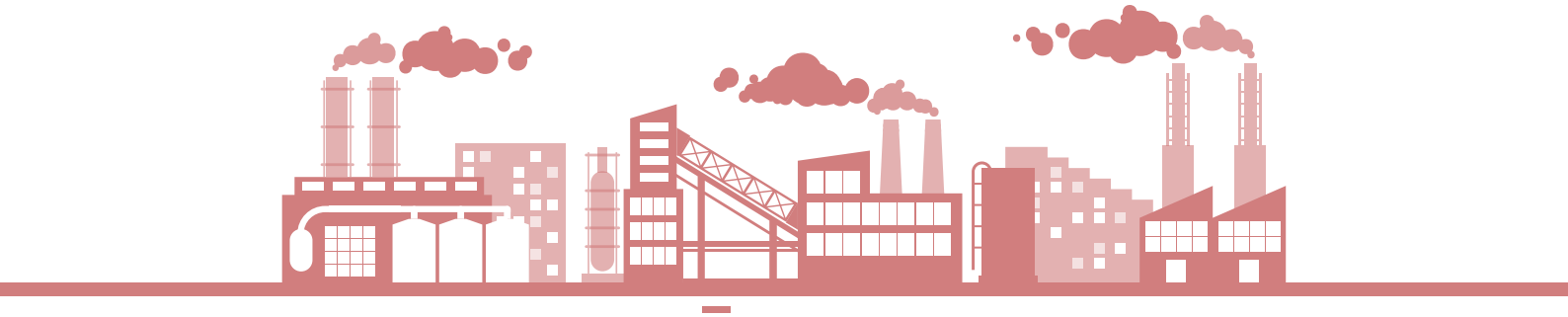
While attempts are being made to enhance the quality of some recyclables with market value, we should not forget that manually performed sorting procedures yields limited results. Most known common form of recycling in Malaysia is the traditional method, otherwise known as mechanical recycling, which is only feasible for homogeneous and single stream resin type. Thus, it is important to stay updated with latest sorting and recycling technologies.

Since plastic products are getting more complex to fulfil business needs and might add problems to existing recycling procedures, an alternative solution to traditional recycling is needed . Advanced[28] recycling technology picks-up where conventional recycling ends by concentrating on commonly used materials but difficult to recycle.

Moving forward, Malaysia should look into advanced technology to improve the efficiency of the recycling industry. Advanced recycling is one of the potential areas to be explored. It breaks down plastic material through the effect of chemical processes, converting them into their original building components, specialty polymers, new plastics feedstocks, fuel, waxes and other valuable products[29]. In the coming years, a ground-breaking process may be needed to remove colour, odour and plastic waste contaminants into the "virgin-like" resin that is the basis for plastic products [30].

"PETRONAS Chemical Group (PCG) together with Plastic Energy Ltd. have collaborated to develop a solution that turns non-recyclable plastic waste into crude naphthalene in Malaysia. This new technology helps divert low quality, mixed plastic waste from being accumulated by turning it into naphthalene quality oil (TACOIL), which can be used to produce virgin quality polymers. In 2020, both organisations completed a feasibility study to establish a facility that converts plastic waste to crude naphthalene. Following this, both organisations will continue with the next phase of the project, which is a detailed engineering study of the facility."

The establishment of an efficient systemic loop supply chain is needed to enhance recycling industries and market competitiveness. This requires a joint effort from all sectors, from the collection, sorting and recycling to the manufacturing and post-consumer, with legislation and enforcement in place[31].



[25] United States Environmental Protection Agency. 2019. National Framework for Advancing the U.S. Recycling System. https://www.epa.gov/sites/default/files/2019-11/documents/national_framework.pdfepa.gov) [19 September 2021]
[26] Chen, H.L., Nath, T.K., Chong, S. et al. 2021. The plastic waste problem in Malaysia: management, recycling and disposal of local and global plastic waste. SN Appl. Sci. 3, 437.
[27] Patel, M., von Thienen,N., Jochem, E., Worrell, E. 2000. Recycling of plastics in Germany. Resources, Conservation and Recycling. 29
[28] American Chemistry Council. 2021. What is Advanced Recycling? And Why is it So Important for Meeting the Growing Demand for Recycled Plastics? https://www.americanchemistry.com/chemistry-in-america/news-trends/blog-post/2021/what-is-advanced-recycling-and-why-is-it-so-important-for-meeting-the-growing-demand-for-recycled-plastics [17 September 2021]
[29] ibid
[30] National Geographic. 2021. Innovations in recycling. https://www.nationalgeographic.com/science/article/partner-content-innovations-in-recycling [17 September 2021]
[31] NSWMD, 2011. A Study on Plastic Management in Peninsular Malaysia. Putrajaya. Department of National Solid Waste Management.

Demand For Recycled Material (Local Feedstock)

With Basel Convention amendments taking effect in January 2021, countries around the world need to create a recycling system that no longer depends on resources from overseas. The strict requirement of this cross-boundary movement of plastic is reducing the inflow of plastic waste (to be processed and used as raw material) and will somehow force the countries to utilise domestic plastic scrap. Subsequently, the countries will have to invest in managing their own plastic waste to be reproduced as consumer product.

As a developing country, Malaysia could explore various mechanisms to encourage adoption of an effective recycling system, thus achieving the objective of circularity. Local industries are encouraged to innovate and adopt sustainable design that promote reuse of materials, recycled materials and/or improving the current complex packaging (including packaging that involve multi components or layers).

Local industries are encouraged to innovate and adopt sustainable design. These mechanisms include introducing incentives for related and relevant efforts, usage of fiscal tools (i.e.: negative price incentives, eco-modulation of EPR, etc) to drive the domestic market, certifications of products as well as services opportunities.

Raising the importance of circularity in business process also needs to be highlighted in the sustainability reporting of listed companies, and as Malaysia is heading towards that move, plastic circularity should be added into that. This could possibly attract more investments and generate more income, contributing to our GDP.

2.3.4 Harmonising standards, regulations and messaging across jurisdictions

At present, standards, regulations and messages vary widely across different ministries and agencies in Malaysia. This provides a confusing outcome for businesses and consumers looking for the right thing. Harmonising Malaysia's standards and policies for give a clear direction of best practices will lead to better outcomes in managing plastic waste.

Harmonised standards are necessary to create conditions for a true circular economy by filling in regulatory gaps on issues like material efficiency, durability, repairability, reusability, and recyclability. Standards can ensure a proper management of the supply chain and material flows (production, consumption, post-consumption phase). Most importantly, properly enforced standards give consumers and businesses a guarantee that the product or process they are using will perform according to the set expectations.

When applied to the end-of-life of plastics, standards are of the utmost importance. To date, many standards in this space have taken the form of test methods rather than specifications. A test method simply sets the criteria for how a material should be tested, but does not specify the outcome of those tests. The most up-to-date standards from around the world now take the form of specifications, where pass-fail criteria are added to ensure that not only is a repeatable test method followed, but a desired outcome is achieved.

It is also important that standards are shown to be equivalent to real-world performance.

Harmonising and developing standards, together with relevant regulations, is not an end in itself. That said, it is an important tool to ensure that the demands for resource-efficient and environment-friendly goods and services is stimulated and increased in Malaysia. Partnership with industry and civil society remains critical for effective delivery.

As much as innovation being promoted as a catalyst to circularity and sustainability, it should not disrupt the existing waste management ecosystem. Malaysia is looking forward to technologies where plastics do not degrade into microplastics and harm the people and planet. Products that fulfil such standards may be certified and labelled accordingly, upon thorough assessment by the certification body, and assured against credible standards. Malaysia also welcomes the development of technologies and standards, as well as adoption of international best standards that allow for a sustainable plastic ecosystem.

2.4 Transitioning to A Sustainable Plastics Economy

2.4.1 Extended Producer Responsibility

Extended Producer Responsibility (EPR) is one of the policy instruments under the circular economy approach that can effectively push for plastic sustainability. Through EPR, all stakeholders in the plastic value chain shall extend their financial and/or physical responsibility across plastic value chain including designing, improvement of product design, and treatment or disposal of their post-consumer products.

EPR for plastic products will be implemented in a phased approach and is beyond CSR, involving all players along the plastic value chain. The scheme is to be driven by an independent entity and upon its implementation, is expected to be financially self-sustaining based on industry contributions.

The implementation of the EPR scheme will begin with a voluntary scheme before transitioning to a mandatory scheme. This takes into consideration the readiness and capabilities of industry players, especially the small and medium-sized enterprises.In the first two years (2021-2022) during the Inception Phase, the government together with industry associations and relevant organisations will advocate for EPR adoption and readiness of the industry through various EPR capacity building programs, as well as implementation of INSPiRE program which will start in 2022.

Before moving into a mandatory EPR scheme in 2026, adoption of Voluntary EPR Phase will be implemented nationwide between 2023 to 2025. The Government's expectation will be for industry to participate in the Voluntary EPR phase.

Obliged parties will contribute an eco-modulated fee to fund the operational cost (to collect, sort, recycle and dispose of their post-consumer waste), and this fee will differ according to type of material and its recoverability and recyclability, as well as production volume and turnover. An independent organisation referred to as the Producer Responsibility Organisation (PRO) will be in the forefront of the EPR scheme.

To ensure smooth transition from voluntary to mandatory schemes, an EPR governance framework will be developed starting in 2022. This will also take into consideration the existing policies, acts and frameworks across ministries and sectors (environment, trade, consumer rights, waste management, etc.) as well as standards and other measures used globally.The EPR governance framework will incorporate the EPR target, responsibilities of each party, eco-modulated fee structure, and mechanism for product improvement.

Before moving into a mandatory EPR scheme in 2026, adoption of Voluntary EPR Phase will be implemented nationwide between 2023 to 2025. The Government's expectation will be for industry to participate in the Voluntary EPR phase.

2.4.2 Producer Responsibility Organisation

Producer Responsibility Organisation (PRO) is a third-party entity that coordinates and carries out collection, sorting, and recycling of packaging waste on behalf of the producers. PRO is central for operating the EPR scheme and interacts with all stakeholders in the value chain, including public agencies and local authorities, which are traditionally in charge of waste management.

PROs exist to exert three main functions:

- Financing the collection and treatment of the product at the end of its life cycle by collecting fees and redistributing the corresponding financial amounts
- Managing the corresponding data
- Organising and/or supervising these activities.

Although the impact of EPR on competition depends on the contextual and design characteristics of the schemes, one central feature is the market structure at the level of Producer Responsibility Organisations, particularly the number of competing PROs offering compliance services to producers.

The three most frequent configurations are:

- EPR schemes managed by one single PRO
- EPR schemes managed by several non-competing PROs (e.g., they cover different product categories)
- EPR schemes managed by several competing PROs.

In addition to the number of competing PROs, the possibility and existence of individual compliance schemes must also be considered. These factors will all be worked through as part of the design process for the EPR scheme.

"In Malaysia, a voluntary PRO known as Malaysian Recycling Alliance (MAREA) was established in January 2021 as an industry-led, pioneering initiative towards a circular economy. Founded by 10 like-minded FMCG companies that are taking the lead in EPR in Malaysia, their goals primarily revolve around enhancing collection, promoting the use of recycled and renewable materials, as well as minimising post-consumer packaging leakage into the environment."

2.4.3 Halal rPET

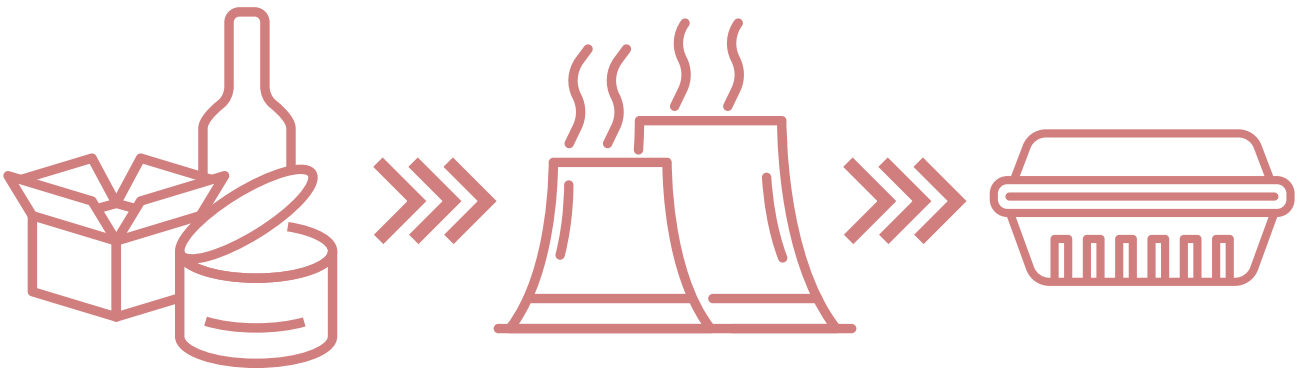
There is a need to provide regulatory clarity/guidance regarding the use of recycled resin in food contact packaging through revision of the 1983 Food Act and Halal certification standards. This will reduce risk for companies that would otherwise be unwilling to produce and use recycled resin for their packaging.

Previously, the existing standards for halal packaging prescribed under MS 2565:2014 Halal Packaging–General Guidelines and within the purview of the Department of Islamic Development Malaysia (JAKIM)— the agency responsible for the Islamic affairs in Malaysia. The relevant requirements are contained in MS2565:2014 section 3.2(d), stating that packaging made for direct food contact application shall not be made from recycled material. Thus, under this standard, it is clear that food-grade recycled resin cannot be used for halal food contact packaging.

However, looking at the potential of bottle-to-bottle initiative as a low hanging fruit to spur the recycling rate of polyethylene terephthalate (PET) through circular economy model in Malaysia, KASA has been actively advocating the need for halal certification of recycled PET (rPET) as well as the material cleansing process to the members of the Halal Consumable Goods Working Group (WG) which consists of experts from JAKIM, Ministry of Health, Federation of Malaysian Manufacturers (FMM), MATRADE, Halal Development Corporation, Persatuan Pengguna Islam Malaysia (PPIM), academia and others. The Department of Standards Malaysia (JSM) act as the secretariat. Going forward Malaysia will recognise the use of recycled resin in producing food-contact packaging.

Hence, the current development of Halal Consumable Goods-General Requirements (MS2738:2021) is expected to push the domestic, regional, as well as global halal rPET market. Local recyclers and producers are encouraged to provide better recycling facilities which are in compliance with halal cleansing requirement prescribed under MS2738:2021.

Henceforth, this Roadmap focuses on the development of a halal rPET ecosystem based on the current mechanical recycling system. Looking at the increased demand for rPET globally which is projected at USD21.56 billion value in 2028, it is pertinent and necessary for local producers and recyclers to also look into other types of resins and recycling methods.



2.4.4 Communicating Circularity and Sustainability

One of the challenges in ensuring plastic circularity and sustainability is getting back used plastics from consumers and then transferring it to recycling plants[32]. Without consumer participation, there will not be enough material to drive a viable circular economy for plastics. Despite the increase in awareness raising campaign to beat plastic pollution, change in consumers behaviour to embrace plastic circularity agenda is still minimal.

Brand owners play an important role in conveying the message and influencing consumer behaviour to create a more circular and sustainable plastic economy. The right consumer messaging from brands can reinforce positive new beliefs among customers, shape emerging habits and ultimately nudge consumers toward more environmentally responsible behaviours, leveraging the push and pull effect.

The quality of a company's communication and its ability to strike the right tone on environmental issues, especially plastics pollution, will increasingly become a competitive advantage. Malaysian consumers – especially younger consumers – are demanding that brands tackle the problem. As a result, consumers are pushing brands to take action which in turn encourages a positive feedback loop as more and more society are influenced by the positive messaging.

Similarly, awareness and behavioural change within businesses is necessary to ensure plastic sustainability is designed into supply chain. Awareness of circular economy principles, such as sustainable design, could translate directly into business decisions that improve circularity. For example, instead of using a coffee cup lid made of polystyrene, which are not easily recycled given Malaysia's current recycling capacity, coffee shops can change to PP or HDPE cup lids which allows for higher recyclability[33]. Advocating positive messaging on redesigning products should be the core component of sustainability effort to tackle plastic pollution.

In the past decade, there is a growing environmental awareness among individuals and communities within Malaysia. This, by and large, resulted from campaigns and education programmes organised by public interest groups which include non-governmental organisations (NGOs), civil societies and other community-based organizations. As such, these groups play an important role in contributing efforts towards sustainability and circularity through participation, advocacy, promoting awareness and education, community engagement, environmental monitoring, developing awareness projects and campaigns, research and development and lastly training and capacity building.

"With the power and expertise to engage and influence the public, NGOs and civil societies are some of the critical groups that can support in communicating the message to the public and drive behaviour change in the long term."

[32] The Sustainability Institute. 2020. Engaging Consumers to Reduce and Recycle. https://www.sustainability.com/thinking/engaging-consumers-to-reduce-and-recycle/ [22 September 2021]

[33] Hooker, L. Four solutions to the disposable coffee cup problem. https://www.bbc.com/news/business-40951041 [19 September 2021]

2.4.5 Other key enablers

Research, Development And Innovation (R,D&I)

Research, development and innovation (R,D&I) can be a catalyst for plastic circularity and sustainability where researchers develop practical solutions. These can include designing and formulating better products, producing new technologies to improve recycling, providing alternatives to help in phasing-out problematic plastic products, or redesigning sustainable packaging with nature in mind. However, the circular economy concept is still new in Malaysia and not getting as much attention from the research funding providers as necessary. Malaysia needs to expand existing R,D&I funding to include plastic sustainability and circularity as part of its scope. A dedicated fund that focuses on specific elements, for example sustainable design, high performance materials, extrusion and recycling technologies, and industry symbiosis would be very beneficial to the industries.

Beyond the classic model of funding provision, Malaysia is also looking at creating new partnerships between academia and industry. This will include developing national competency and expertise for new emerging technologies in line with international best practices and technological advancement.

Alternative Financing

Financial institutions have a key role in encouraging and stimulating circularity by investing in sustainable consumption and production[34] . According to UNEP, financial institutions can support circularity in many ways, including:

- Re-orienting investments towards more sustainable technologies and businesses that enhance the circularity of economies; finance restorative and regenerative business models in a sustainable manner over the long-term; start developing strategy execution pathways to contribute to the creation of a low-carbon and climate resilient through circular model;
- Integrating the circularity or 9-R concept (Refuse, Reuse, Reduce, Redesign, Repurpose,Remanufacture, Repair, Refurbish, Recycle) in financing policies, product development and client engagement
- Integrating environmental, social and governance (ESG) component, identify significant impacts and set targets related to resource efficiency in the transition.

Plastic Data Analytics

To date, national-level data regarding plastics is fragmented and not comprehensive. Information of production volume per application is not accessible, neither is data on plastic consumption, plastic waste collected, and plastic waste recycled (material processed). Based on the national economic statistics from DOSM, plastic manufacturing falls under the overall manufacturing activities, making it difficult to understand the total sales of plastics by local manufacturers at end-use sector level. On the other hand,considering the lack of a harmonised plastic waste collection system and the involvement of the informal sectors, it is challenging to access the volume of plastics and the specifics such as resin type and application within the municipal waste stream on a national level.

The existence of complete and consolidated data is crucial to map the market potential through the material flow analysis. As of now, data collection largely relies on voluntary reporting from the industry through various platforms. Thus, there is a need to collect data through an open data platform, where it can be done more systematically, transparently and holistically.

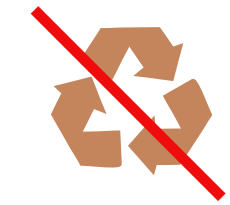
[34] UNEP Finance Initiative. 2020. Financing Circularity: Demystifying Finance for Circular Economies. Nairobi. United Nation Environment Programme

CHAPTER 3 - SETTING NATIONAL TARGETS

3.1 Phasing out problematic SUPs

The most significant step Malaysia can take is reducing unnecessary SUPs to lessen the burden on the waste management system. In order to achieve a circular economy for plastics, it is important to carefully consider what is put into the market in the first place. This commitment recognises that principle, and signals the intent of companies to actively identify problematic and unnecessary plastic packaging in their portfolio and to take action to phase-out those through redesign, innovation, and new (reuse) delivery models.

The criteria listed below (but not limited to) is provided to help identify problematic or unnecessary plastic items:



It is not reusable, recyclable or compostable

It contains, or its manufacturing requires, hazardous chemicals that pose a significant risk to human health or the environment (applying the precautionary principle)

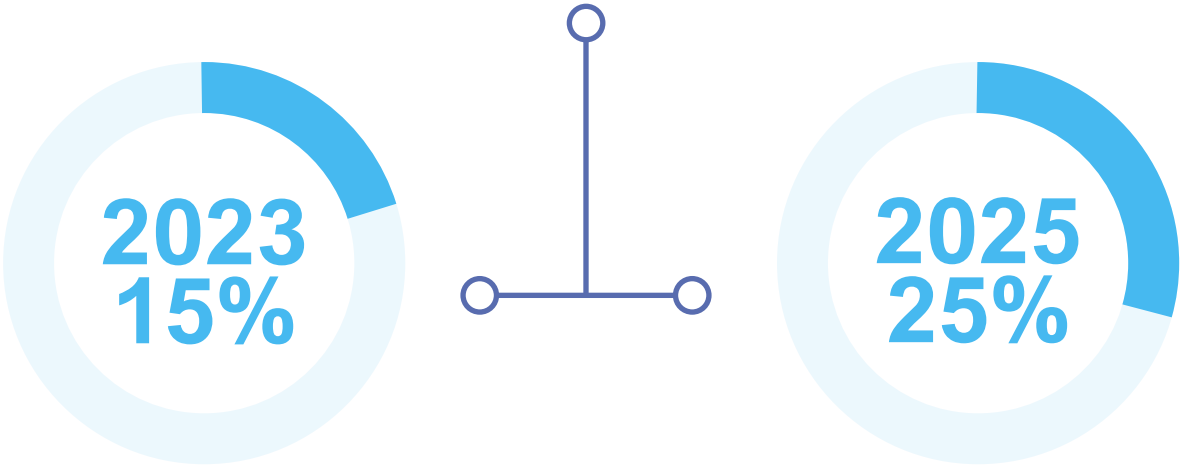
It can be avoided (or replaced by a reuse model) while maintaining utility

It hinders or disrupts the recyclability or compostability of other items

It has a high likelihood of being littered or ending up in the natural environment.

The list will be prioritized based on consumption, impact and available alternatives, developed through discussion with stakeholders. The process of phasing out problematic SUPs will start with identification of national problematic SUPs in 2022 and the overall phasing-out process will be done progressively.

3.2 25% post-consumer plastic packaging to be recycled by 2025

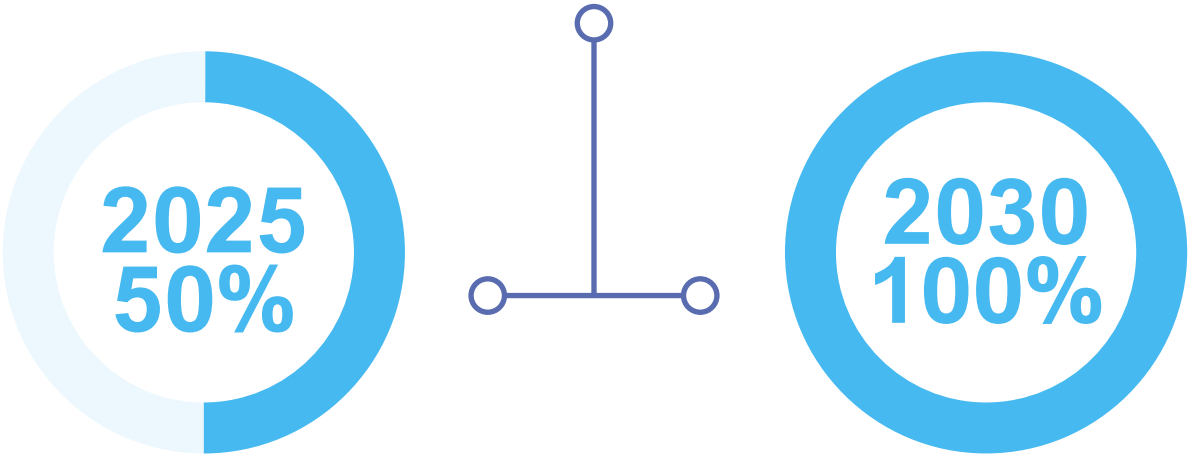


This target aims to achieve a national plastic recycling rate of an average 25% for all locally generated post-consumer plastic packaging waste. A systemic approach is required bringing together businesses, government, and citizens – all playing key roles in stimulating the system change and behaviour change required to achieve this target.

"Efforts and actions taken should be focusing on domestic materials recovery by supplying high-quality recyclables post-consumer plastic packaging waste to the recycling sector, to reduce their dependence on importation of plastic wastes from other countries. Therefore, it is more crucial than ever to improve domestic recycling in Malaysia.

This target was set based on the recent data on the recycling rate for plastic packaging in Malaysia and feedback from the Malaysia Plastic Recycling Association and Malaysia Plastic Manufacturers Association. Target number (3) on switching to 100% recyclable will help achieve this target by having more high-quality recyclable packaging for material recovery.

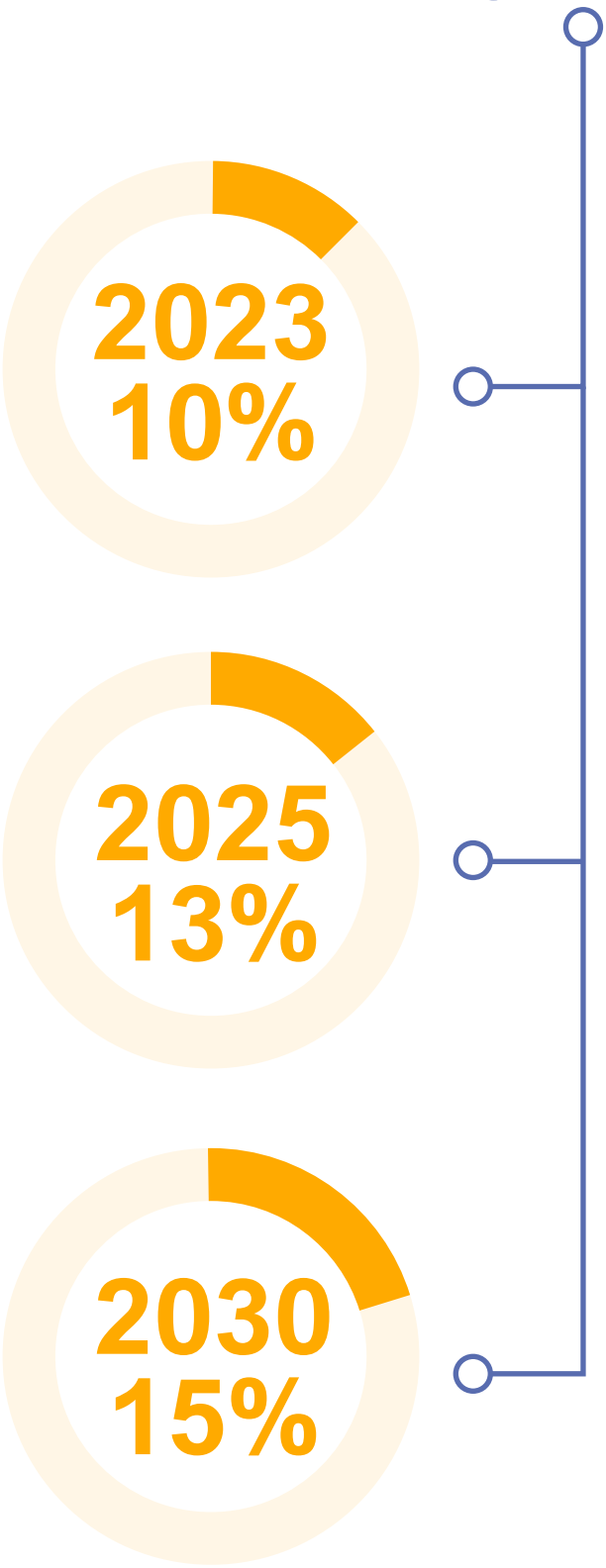
3.3 100% recyclability of plastic packaging by 2030



In a circular economy, waste and pollution are designed out, products and materials are kept in use, ensuring closing the loop for a regenerative natural system. Each process, service, product or packaging item needs to be designed to fit such ecosystem. This means that each piece of (plastic) packaging is readily recyclable after several reuse cycles.

100% recyclability rate of plastic packaging commitments are important, as the circularity of a packaging item starts with its design phase. While existing solutions are available and proven to be viable, further innovation in business models, packaging designs, collecting, sorting, and recycling technologies will be required to achieve this commitment in a viable way that reduce detrimental impact on the environment.

3.4 15% average recycled content by 2030



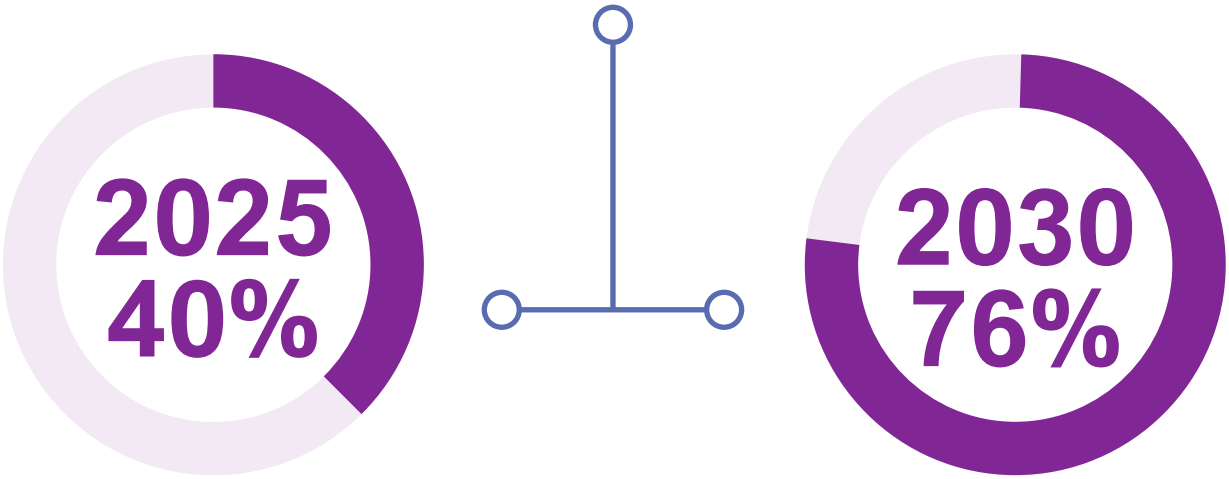
Products and components are to be made from as much recycled content as possible (where technically possible). This supports reducing dependency on virgin (fossil) feedstocks and creates a demand-pull for recycled plastics. It sets a clear direction to stimulate investments in the collection, sorting and recycling industries. It is important that industries with requirements for high-quality materials, such as the packaging industry, maximise the use of recycled content (keeping in mind regulatory constraints, such as food contact and health and safety regulations). Firstly, keeping materials at their highest utility and value at all times maximises the number of possible future use-cycles of the material. Secondly, because if all plastics were to be recycled into lower-quality applications - the 'high-quality industries' such as packaging would remain dependent on continuous virgin material input.

This target was determined based on the latest commitment from consumer brands on their ability to achieve a certain percentage of recycled content in their packaging, much higher than the 15% average, at about 25-30% at the moment. By taking into consideration the challenges faced by domestic producers and small-medium enterprises (SMEs) to achieve similar commitment levels to the MNCs, Government has proposed to lower the average recycled content target to 15% to ensure all producers, including domestic producers/brands, are involved in achieving similar goals.

The Government reserves the right to revise the target based on progress made at annual review points.

A dedicated target for each category of material is to be established by a think tank, guided by industry input.

3.5 76% average collected-for-recycling (CFR) rate by 2030



The weighted average of the CFR rates of all key resin in Malaysia for 2019 is 24%. This is very low compared to the global rate. For example, the global CFR for PET is between 55% - 57%, while ours is only at 28% - 45%. To ensure continuous supply of feedstocks and unlock maximum potential value from domestic plastic waste, average CFR rate across resin types need to reach 76% by 2030. Increasing collection for recycling is also key to reducing the level of mismanaged plastic waste in Malaysia from its current high level of 63%.

A number of interventions must take place to increase the CFR rate to 40% in 2025 and 76% in 2030, as follows:

- Increase sorting efficiency of post-consumer collection of plastics;
- Set recycled content targets across all major end-use applications;
- Mandate "sustainable design" standards for all plastics application, especially packaging;
- Encourage increase in recycling capacities (mechanical and chemical)
- Industry-specific requirements to collect post-use products

3.6 Post-consumer halal rPET standards by 2022

The halal rPET market is estimated to be worth of USD21.56 billion by 2028. However, current halal standards does not allow for food-contact packaging made from recycled resin. As mentioned in Section 2.4.3, the current development of Halal Consumable Goods - General Requirements (MS2738:2021) will chart the pathway for halal certification of products made from recycled resin focusing on rPET through mechanical recycling.

Other key activities and targets are reflected in **Figure 6.**

Figure 6

MALAYSIA PLASTICS SUSTAINA

Catalysing Sustainability and Circula

2021

PLASTIC BUSTERS Program

Identifying problematic SUPs

Establishment of Think Tank

Establishment of TWG for data sharing platform

Inception of Voluntary EPR (2021-2022)

MASPA ∞ MAREA (2021 - 2023)

2023

Adoption of Voluntary EPR (2023 - 2025)

Phasing out problematic SUPs (2023-2030)

2025

Setting minimum threshold of recycled packaging

01

Inception of Voluntary EPR

Adoption of Voluntary EPR

INSPiRE Program

EPR governance framework (2022-2024)

CE Data Network Platform (2022-2025)

Empowering informal Sector (2022-2026)

Mandating sustainable design

Improvising plastic recovery management and setting minimum threshold for CFR

Increase demand for recycled material (2024-2030)

Full implem mandatory packaging

Mid-term review

2022

2024

2026

ABILITY ROADMAP, 2021—2030

rity towards A New Plastics Economy

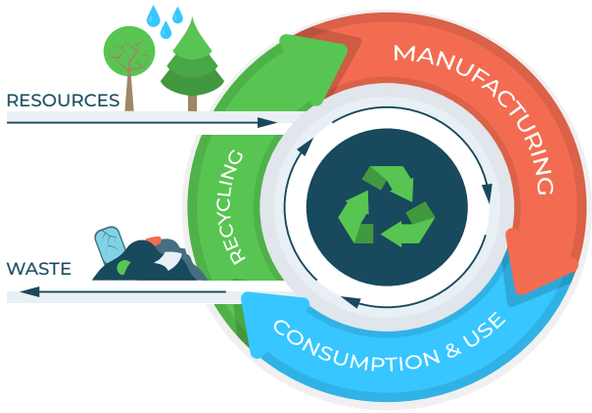
content for (2025-2026)

2

2027

Setting minimum threshold of recycled content for automotive (2027-2029)

2029



03

Start mandatory EPR by 2026 | Full implementation of mandatory EPR for packaging

R,D&I Funding

Market-based instrument and alternative financing

Training for SMEs (Module development and training program)

Communication, Education and Public Awareness (CEPA & Behavioral Change activities)

Circular Economy Award

entation of EPR for

Mandatory waste management plan (divert plastic from landfill) for construction sector (2028-2029)

2028

Setting minimum threshold for recycled content for construction

Plastic's End-of-Life Vehicle Scheme (Automotive)

2030

CHAPTER 4 - ROLES AND RESPONSIBILITIES

In Malaysia's plastics value chain, there is a complex mix of actors. For simplicity, the components are mapped against three categories of up-, mid- and downstream activities. Figure 7 presents a high-level overview of aggregated value chains in the plastics industry across sectors, including the key actors across the value chain, the social sector, and the government.

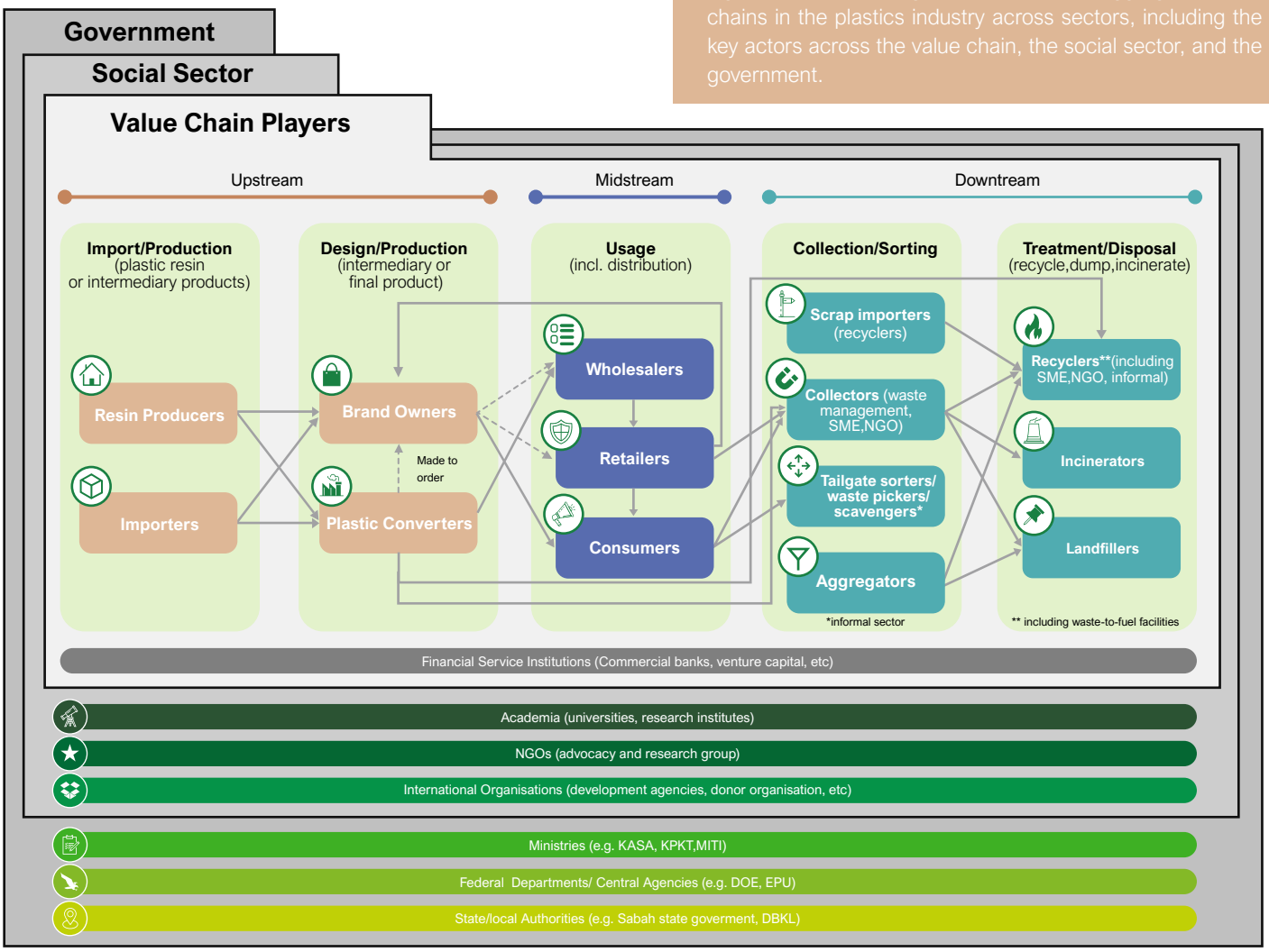


Figure 7: Overview of key stakeholders across Malaysia's Plastic Value Chain

In the upstream segment, petrochemical companies and importers make resins available as commodities to converters, while different industries procure and convert specific resins into their semi-manufactured or final products, which are sold domestically or exported abroad. In the midstream, consumers purchase products or services that involve plastics usage via retailers and wholesalers who distribute the goods.

In the downstream segment, formal and informal waste management actors link households and businesses to EOL facilities, which range from landfilling to advanced recycling or recovery plants. Furthermore, other stakeholders have cross-cutting involvement or influence in the plastics value chain. Financial service institutions help finance new business endeavours, academia conducts research regarding circularity solutions, while NGOs' advocacy and research work typically aims to promote targeted solutions. Understanding these actors' roles in shaping the value chain is important for allocating the roles and responsibilities as well as as mobilising resources for the implementation of this roadmap

Malaysia will only be successful in building a circular economy for plastics in Malaysia if we take a whole-of-nation approach.

Table 5 suggests roles and responsibilities of key players for each action plans.

Action Plan
Phasing out problematic and unnecessary single-use plastics (SUPs)

Expected Outcome

5 problematic SUPs phased out

Roles and responsibilities of Government

KASA leads the research effort with assistance from other ministries/agencies to identify the items and principles or strategies needed.

The role of other ministries/agencies will be identified in the study itself.

Roles and responsibilities of Private Sector

Brand owners and plastics manufacturers lead this initiative through voluntary commitment to phase out and support the plan, and look into other business models to provide alternatives to consumers.

Roles and responsibilities of Civil Sector

Environmental NGOs continue to advocate and increase awareness among companies as well as consumers, and share relevant feedback to government based on their engagement/ findings on the ground

Action Plan
Mandating sustainable design

Expected Outcome

50% of plastic packaging to be recycled

Roles and responsibilities of Government

MITI leads and develops the standards that support the sustainable design initiative

KASA provides technical advice for the standard development Specific bodies/ agencies (e.g., CIDB, MARII, Automotive

Business Development Committee) of the sector as co- lead of the initiative

Roles and responsibilities of Private Sector

Associations advocate members to adopt the sustainable design standard in their design

Industry adopts and implements based on guidance available

Roles and responsibilities of Civil Sector

NGOs assist through advocacy, raising awareness and capacity building, and as well outreach efforts

Action Plan
Implementation of Extended Producer Responsibility (EPR) scheme for plastics

Expected Outcome

Voluntary EPR scheme adopted (2021 – 2025)
Mandatory EPR scheme adopted nationwide by 2026

Roles and responsibilities of Government

KASA and KPKT leads the effort to convene on establishing a governance framework for EPR schemes in line with national circular economy policy. This includes setting collection targets and obliged companies.

KASA advocates and works on the implementation of EPR for plastics in accordance with the governance framework. MITI provides technical advice on the identification of obliged companies for the mandatory scheme.

MEDAC advises and guides SMEs in transitioning to circularity and implement EPR

KPDNHEP develops opportunities for distributors network/ businesses in the plastic value chain, and advise on EPR scheme effect on domestic market.

KKM advises on the food and product safety

Other ministries/agencies advise and assist the implementation of EPR in relevance to their jurisdiction

Roles and responsibilities of Private Sector

Producer Responsibility Organisation (PRO) represents local and international brand owners active in the Malaysian market will play the key role in advocating EPR, providing input on EPR governance framework and setting up the modulated fees.

Trade / industry associations provide stakeholders feedback on the governance framework and EPR implementation.

Roles and responsibilities of Civil Sector

NGOs provide advocacy, dialogues between government and industry, education and awareness.

Action Plan
Improvising plastic recovery and setting minimum CFR rate

Expected Outcome
40% CFR rate by 2025
76% CFR rate by 2030

Roles and responsibilities of Government
KPKT leads with the initiative to develop mechanisms to improve plastic recovery

State governments to co-lead the effort and advocate to the concessionaires within the state.

KASA assists in setting direction to achieve the target set.

MOF advises on the appropriate financial instruments.

Roles and responsibilities of Private Sector
Waste management companies (i.e., the three concessionaires in Act 672 states and private contractors in others) support the implementation of such waste collection services.

Roles and responsibilities of Civil Sector
NGOs assist through advocacy, raising awareness and capacity building, and as well outreach efforts

Action Plan
Increase demand for recycled material

Expected Outcome
Domestic demand for local recycled material increased

Roles and responsibilities of Government
Technical Working Group consists of JAKIM, Standards Malaysia

KASA, and MOH work on revising current standards. MOH reviews and revises current 1983 Food Act (Act 281) based on current needs

MITI provides/promotes incentives scheme for Halal products as to encourage the industry uptake

Roles and responsibilities of Private Sector
Industry players comply and start incorporating recycled material in the production according to the standard

Manufacturing association design CEPA program on Halal certification standards for awareness

Roles and responsibilities of Civil Sector
N/A

Action Plan
Setting minimum threshold of recycled content for packaging

Expected Outcome

15% recycled content in product by 2025

Roles and responsibilities of Government

KASA provides technical input to the implementation
Specific bodies/ agencies of the sector as co-lead of the initiative

Roles and responsibilities of Private Sector

Associations advocate members to incorporate recycled content as feedstock during manufacturing processes
Industry set target collectively on the threshold of recycled content in packaging

Roles and responsibilities of Civil Sector

N/A

Action Plan
Alignment between MASPA and MAREA

Expected Outcome

Strengthen public-private collaboration

Roles and responsibilities of Government

KASA develops collaboration and workplan to synergise both entities

Roles and responsibilities of Private Sector

MAREA advises and collaborate with KASA.

Industry provides inputs to the workplan.

Roles and responsibilities of Civil Sector

NGOs advises and collaborate with KASA

Action Plan
Empowering Informal Sector

Expected Outcome

Informal sector mainstreamed

Roles and responsibilities of Government

KPKT integrates informal sector into the ecosystem

KASA integrates participation of informal sectors within plastic circularity efforts

MITI provides incentives to recycling industries

Roles and responsibilities of Private Sector

PRO & Recyclers bridge and encourage involvement of informal sectors through various mechanisms

PRO facilitates the responsibility of producers to take back plastic waste from open market by engaging informal sectors to recycle or process and the compliance

Roles and responsibilities of Civil Sector

NGOs assist through advocacy, raising awareness and capacity building, and as well outreach efforts to empower informal sector

Action Plan
R,D&I funding

Expected Outcome
Local innovation and adoption of circular economy solution increased

Roles and responsibilities of Government
MOSTI (including MAGIC), MOHE and MTDC to improve access to funding plastics circularity projects/ solutions.

Roles and responsibilities of Private Sector
Companies across four prioritised sectors apply for R,D&I funding.

Private industries to include R,D&I allocation for development of plastic circularity solutions within organisation

Start-ups and SMEs (e.g., via the SME Association of Malaysia) that are eligible apply for the fund.

Roles and responsibilities of Civil Sector
Research institutions apply for R,D&I funding.

Multilateral development institutions and donor organisations provide financial support for the R,D&I scheme.

Action Plan
CE Data Network Platform

Expected Outcome
Market data available and accessible

Roles and responsibilities of Government
KASA develops the platform and establish a technical working group (TWG) that consists of experts to work together in defining problems and issues regarding national plastic circularity data. This TWG will be responsible to decide on:

i) Type of data including data confidentiality, integrity and sensitivity

ii) Sharing platform including open data

iii) Harmonised reporting

Other ministries mandate their agencies and companies that fall under their jurisdiction to submit the data and share available information

Roles and responsibilities of Private Sector
Bursa Malaysia mandates reporting of plastic production/ volume put in market and plastic sustainability efforts under its sustainability reporting criteria (for listed companies)

Companies contribute information and data

Associations contribute and verify information and data

Industry representatives become part of TWG and contribute relevant feedback to enhance the implementation of the platform

Roles and responsibilities of Civil Sector
NGOs encourage companies to report/ contribute data

Action Plan
Market-based instrument and alternative financing

Expected Outcome
Number of companies adopting circular economy/ plastic sustainability approach increased

Roles and responsibilities of Government
MOF and MITI lead the effort to finalise the scope, level, and eligibility of the incentives.

KASA (including MGTC) leads the update of green procurement criteria to cover products and provides technical advice on material efficiency and refurbishment/ remanufacturing related technologies.

Roles and responsibilities of Private Sector
Companies provide stakeholder feedback on the scope of the incentives, and green procurement scope and criteria.

Financial service institutions facilitate the industry players in financing applications and report on the progress to the government.

Roles and responsibilities of Civil Sector
NGOs enter strategic collaborations with national and local governments to provide technical guidance to businesses on:

i) the conditions for eligibility of incentives and encourage them to adapt their business models to take advantage of the intervention.

ii) complying with the government's specifications.

Action Plan
Training for SMEs

Expected Outcome
Number of local SME personnel trained in CE increased

Roles and responsibilities of Government
KASA and MGTC to develop the training module and programme.

MEDAC and SMECORP support the programme by providing the training need analysis and promote it to the SMEs.

MITI (MPC) facilitates best practices and productivity among SMEs

Roles and responsibilities of Private Sector
Industry players participate in the training programme and provide feedback where relevant.

Roles and responsibilities of Civil Sector
Relevant NGOs to assist in content development and promotion where relevant

Action Plan
Circular Economy Award

Expected Outcome
Improved corporate action

Roles and responsibilities of Government
KASA establishes and organises the award and its criteria

SME enhances criteria of related current award schemes to include plastic sustainability.

Roles and responsibilities of Private Sector
Associations disseminate and encourage its members to qualify for the award.

Roles and responsibilities of Civil Sector
NGOs to assist in developing the criteria and disseminate information about the award.

Action Plan
PLASTICBUSTERS Program

Expected Outcome
Create awareness among public servants as well as public to prevent unnecessary use of plastics, and practice good plastic management

Roles and responsibilities of Government
KASA leads the initiative, developing implementation guideline for civil service.

Other ministries replicate and implement the program.

Roles and responsibilities of Private Sector
Business operators in the government premises support the initiative through suitable means, in line with the guidelines provided.

Roles and responsibilities of Civil Sector
NGOs advocate the importance of plastic circularity and create awareness.

Action Plan
INSPiRE Program

Expected Outcome
Create success stories for Malaysia sustainability and circularity initiatives

Roles and responsibilities of Government
KASA implements the program to nudge industrial behavioural change

Roles and responsibilities of Private Sector
Interested companies participate in the program as role model /catalyst for a sustainable plastic value chain

Roles and responsibilities of Civil Sector
N/A

Action Plan
Communication, Education and Public Awareness (CEPA) and Behavioural Change Programmes

Expected Outcome
Improved corporate action and behavioural change

Roles and responsibilities of Government
KASA and other relevant ministries organise CEPA and behavioural change program

Roles and responsibilities of Private Sector
Industry players and Association collaborate with government to organise and disseminate relevant information to industry players/ public

Roles and responsibilities of Civil Sector
NGOs collaborate with government to organise and disseminate relevant information to industry players/ public

Table 5: Implementation and resource mobilisation plan

CHAPTER 5 - WAY FORWARD

With this Plastic Sustainability Roadmap, Malaysia enters a new era of progress towards a circular and sustainable economy for plastics. This Roadmap sets out a robust and clear way forward underpinning our Malaysia's contribution in tackling the global challenge of plastic pollution. In consultation with industry, civil society and other stakeholders, the Government will ensure that the Roadmap is carried out and the specific actions identified are delivered. Clear governance architectures will be put in place to oversee and steer the implementation of the Roadmap.

5.1 National Governance for Plastic Circularity

5.1.1 National Steering Committee (Joint Steering Committee)

The implementation of this Roadmap will be reported as one of the key agenda under the National Steering Committee for Roadmap towards Zero Single-Use Plastics, 2018 – 2030.

5.1.2 Technical Committee

A technical committee will be established to oversee the overall implementation of this Roadmap. This committee will work together with the dedicated division under KASA.

Specific committee(s) may be established to address specific action plans/technical issues.

5.1.3 Think Tank

A strategic Think Tank comprising government representatives, industry experts, academia, and civil society organisations will be established. This think tank will look into identifying collective interests and coordinate across different stakeholders to catalyse action towards plastic sustainability, specifically on (but not limited to):

- "New plastic economy" definition;
- Target setting;
- Market forces;
- Cost-pass through;
- Microplastics issue;
- Standards harmonisation;
- Creating sustainable demand for recycled resin;
- Multi-disciplinary research on plastic (social, economy and environment); and
- EPR mechanisms.

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